THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CIX. No. 2438.] LONDON, FEBRUARY 1, 1910. [62ND YEAR. PRICE 6d.

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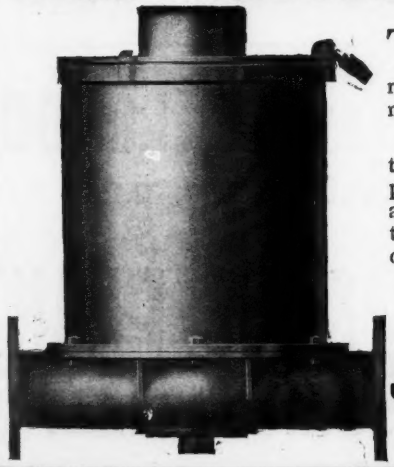

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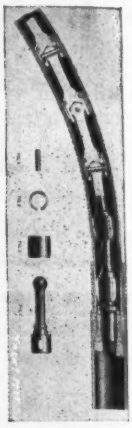

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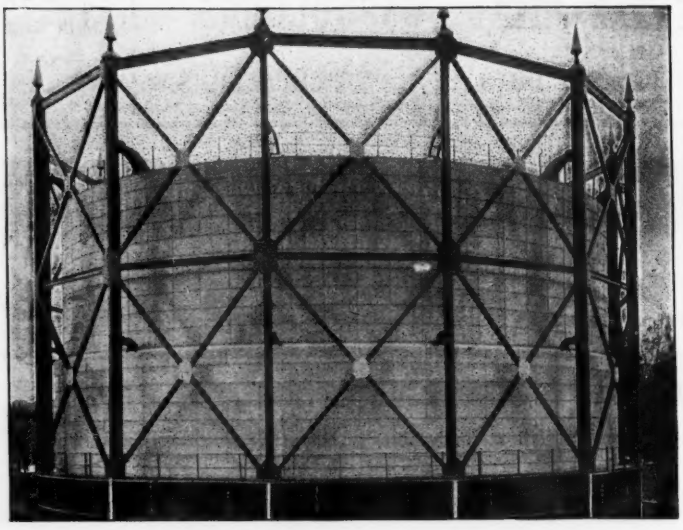

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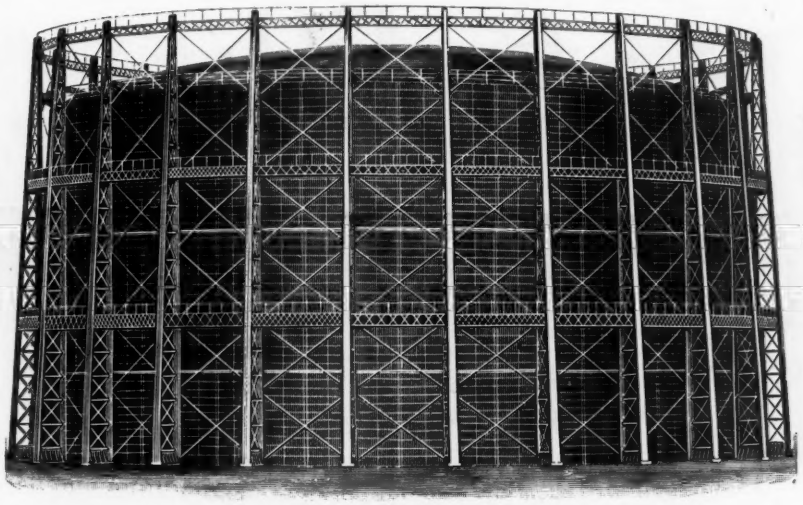

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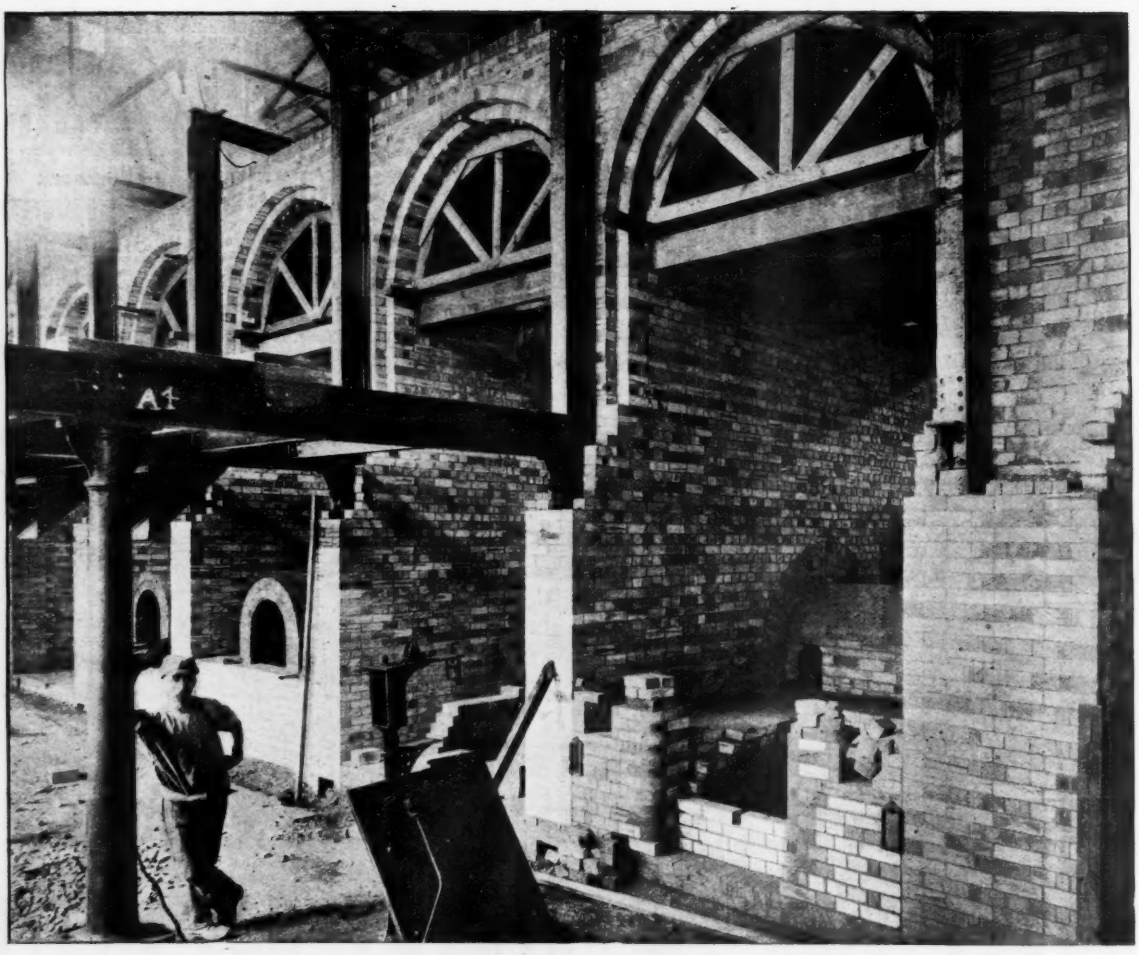

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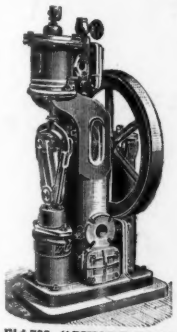

Fig. 705. "SINGLE RAM" STEAM-PUMP.

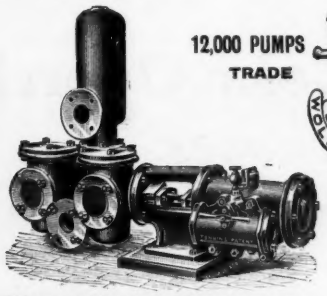

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

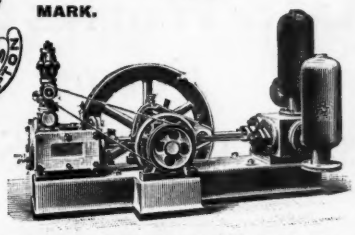

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

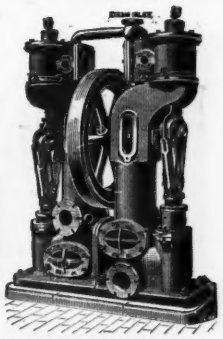

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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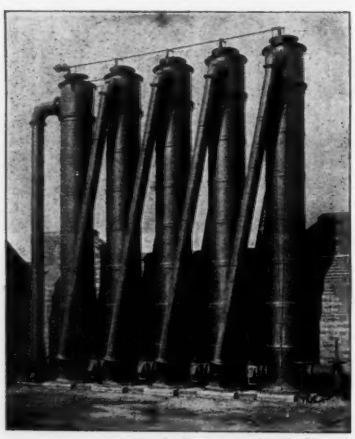

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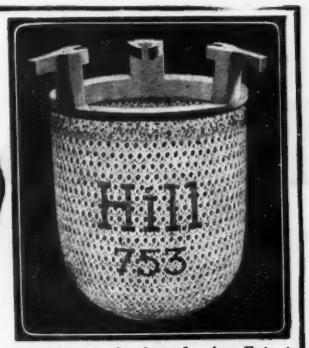

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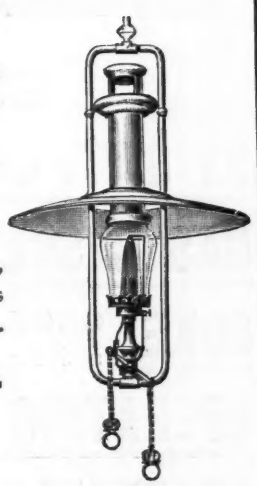

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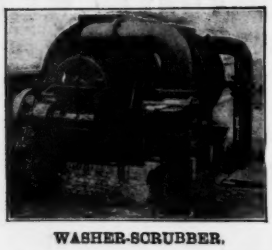

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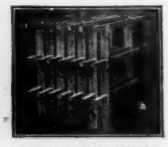

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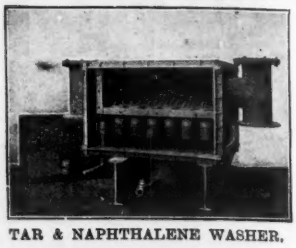

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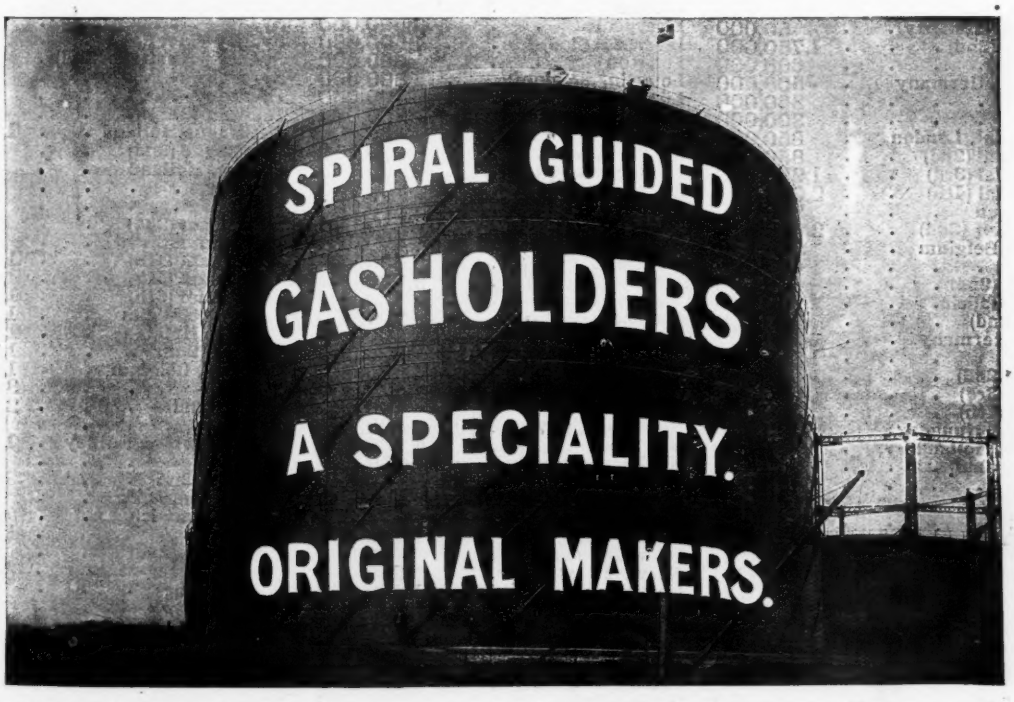

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Berlin—Rixdorf (2nd)	700,000	Göteborg (2nd)	600,000	Rotterdam (2nd)	1,500,000
Berlin—Tegel	3,500,000	Graudenz, Prussia	200,000	Rotterdam (3rd)	750,000
Berlin—Tegel (2nd)	6,350,000	Guildford	350,000	Rotterdam (4th)	750,000
Bilston	375,000	Guildford (2nd)	200,000	Rotterdam (5th)	600,000
Birmingham	1,500,000	Haarlem, Holland	850,000	St. Albans	700,000
Bishop's Stortford	200,000	Hamburg, Germany	1,750,000	St. Gallen, Switz.	225,000
Bochum, Westphalia	530,000	Hampton Court	500,000	St. Gallen (2nd)	225,000
Bognor	100,000	Hampton Court (2nd)	600,000	St. Joseph, Mo.	750,000
Bordentown, N.J.	125,000	Hartlepool	750,000	San Paulo, Brazil	700,000
Bournemouth	1,000,000	Hebden Bridge	200,000	Santiago de Cuba	400,000
Bournemouth (2nd)	500,000	Heidelberg, Germany	200,000	Scarborough	800,000
Bremen, Germany	550,000	Holyoke, Mass.	600,000	Schwelm, Westphalia	100,000
Bremen (2nd)	950,000	Hong Kong	450,000	Shanghai	225,000
Bremen (3rd)	850,000	Hull	1,500,000	Shanghai (2nd)	225,000
Brentford	1,200,000	Ilford	650,000	Shanghai (3rd)	1,600,000
Brentford (2nd)	850,000	Innsbruck, Austria	200,000	Southampton	800,000
Bridgwater	200,000	Ipswich	750,000	Southampton (2nd)	500,000
Bridlington	150,000	Kampen, Holland	350,000	Southampton (3rd)	600,000
Bridlington (2nd)	200,000	Kiel, Sleswig	1,000,000	Southgate	400,000
Brieg, Silesia	100,000	Kiel (2nd)	880,000	Southport	750,000
Brighton	1,750,000	L. & N.W. Rly., Crewe	700,000	Southport (2nd)	900,000
Brighton (2nd)	1,850,000	Lausanne, Switz.	250,000	South Shields	650,000
Bromley	1,500,000	Lawrence, Mass.	400,000	Stafford	500,000
Bruges, Belgium	200,000	Lea Bridge	350,000	Staines	600,000
Brussels—Anderlecht	350,000	Lea Bridge (2nd)	350,000	Stettin, Germany	880,000
Brussels—Anderlecht (2nd)	350,000	Lea Bridge (3rd)	400,000	Stockholm	1,500,000
Brussels—Forest	1,000,000	Lea Bridge (4th)	1,000,000	Stockholm (2nd)	1,750,000
Brussels—Koekelberg	1,000,000	Leeuwarden, Holland	400,000	Stockport	600,000
Brussels—St. Gilles	1,000,000	Leiden, Holland	500,000	Stockport (2nd)	600,000
Brussels—St. Josse	1,000,000	Leiden (2nd)	575,000	Stockport (3rd)	400,000
Brussels—St. Josse (2nd)	600,000	Leigh, Lancs.	350,000	Stockton-on-Tees	500,000
Brussels—Ville	750,000	Lemberg, Galicia	260,000	Swansea	750,000
Brussels—Ville (2nd)	750,000	Lemberg (2nd)	500,000	Swansea (2nd)	1,000,000
Brussels—Ville (3rd)	1,500,000	Liége, Belgium	1,000,000	Swansea (3rd)	450,000
Brussels—Ville (4th)	350,000	Liége (2nd)	750,000	Swindon	300,000
Bucarest, Roumania	1,100,000	Lincoln	500,000	Sydney—Harbour	500,000
Budapest, Hungary	50,000	Liverpool	3,500,000	Sydney—Harbour (2nd)	500,000
Budapest (2nd)	1,750,000	Liverpool (2nd)	4,500,000	Sydney—Mortlake	500,000
Carlisle	600,000	Longton	600,000	Sydney—Mortlake (2nd)	500,000
Carlsruhe, Germany	500,000	Louvain, Belgium	800,000	Syracuse, N.Y.	850,000
Chigwell	350,000	Lübeck, Germany	400,000	Taunton	225,000
Chorley	300,000	Maastricht, Holland	200,000	Taunton (2nd)	350,000
Commercial, London	850,000	Magdeburg, Germany	1,400,000	The Hague Holland	1,000,000
Commercial (2nd)	850,000	Maidenhead	225,000	The Hague (2nd)	500,000
Commercial (3rd)	1,250,000	Maidenhead (2nd)	225,000	Tilburg, Holland	400,000
Commercial (4th)	2,000,000	Maidstone	500,000	Torquay	350,000
Copenhagen	700,000	Malines, Belgium	500,000	Tottenham	750,000
Copenhagen (2nd)	2,500,000	Malmö, Sweden	350,000	Tottenham (2nd)	750,000
Courtrai, Belgium	250,000	Malta	400,000	Tottenham (3rd)	350,000
Coventry	600,000	Manchester	3,500,000	Tottenham (4th)	1,000,000
Coventry (2nd)	600,000	Manchester (2nd)	3,500,000	Tottenham (5th)	1,000,000
Cracow, Galicia	200,000	Marlborough	100,000	Tottenham (6th)	1,250,000
Cracow (2nd)	200,000	Mayence, Germany	700,000	Tunbridge Wells	1,000,000
Crefeld, Germany	500,000	McKeesport, Pa.	500,000	Utrecht, Holland	1,000,000
Croydon	1,250,000	Merthyr Tydfil	300,000	Utrecht (2nd)	1,000,000
Croydon (2nd)	625,000	Middlesbrough	1,250,000	Verviers, Belgium	1,000,000
Croydon (3rd)	625,000	Namur, Belgium	175,000	Vienna	3,500,000
Croydon (4th)	550,000	Nelson	400,000	Vienna (2nd)	2,500,000
Debreczin, Hungary	100,000	Newburgh, N.Y.	600,000	Waltham	400,000
Deventer, Holland	150,000	New York	5,200,000	Wandsworth & Putney	1,800,000
Deventer (2nd)	200,000	Nictheroy, Brazil	250,000	Watford	300,000
Dorking	150,000	North Middlesex	150,000	Watford (2nd)	350,000
Dublin	2,000,000	North Middlesex (2nd)	200,000	Wellington, N.Z.	350,000
Dublin (2nd)	2,000,000	North Middlesex (3rd)	75,000	West Bromwich	550,000
Dublin (3rd)	650,000	Norwich	1,000,000	West Ham	1,500,000
Dundee	1,500,000	Norwich (2nd)	300,000	West Ham (2nd)	800,000
Dunedin, N.Z.	150,000	Norwich (3rd)	500,000	Weston-super-Mare	350,000
Dunedin, N.Z. (2nd)	275,000	Nottingham	1,000,000	Weston (2nd)	350,000
Durham	200,000	Nottingham (2nd)	1,000,000	Wexford, Ireland	100,000
Düsseldorf, Germany	1,000,000	Nuneaton	125,000	Wiesbaden, Germany	850,000
Eastbourne	1,250,000	Oberhausen, Germany	175,000	Winchester	225,000
Edinburgh	2,000,000	Oldenburg, Germany	200,000	Winchester (2nd)	125,000
Epsom	225,000	Ostend, Belgium	100,000	Wolverhampton	1,500,000
Epsom (2nd)	300,000	Ostend (2nd)	200,000	Zwolle, Holland	200,000
Falmouth	150,000	Perth, W.A.	125,000	Zwolle (2nd)	200,000

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EDITORIAL NOTES—GAS, &c.

The Final Accounts under the Old Conditions.

THE half-yearly accounts of the Gaslight and Coke Company which we publish to-day will be the last that will be issued under the old order of things. In several respects, conditions will change. The West Ham district will in future come into account, a gas supply under a prescribed standard of 14 candles will be the rule, and the price of gas for ordinary consumption north of the Thames will be at the lowest figure—2s. 8d.—ever reached by the Company. Comparison of results under the new circumstances and the old will therefore be somewhat difficult—indeed impossible; but all associated with the Company have the satisfaction of knowing that they are leaving the old conditions behind with accounts that have never been excelled in any material aspect in the history of the concern. The Governor of the Company (Mr. Corbet Woodall) will no doubt show this with greater transparency from his inner knowledge of the affairs than we are able to do from the bare figures before us. But they alone, in their portrayal of the final results of the half-year's trading, are somewhat extraordinary in relation both to finance and manufacture. It is no good now bemoaning the past; but one cannot help feeling, with before him the consistent tale of improvement in the issues of working and trading as (though the gas consumption has not up to the past half year been striking in its movements) latterly unfolded half year by half year, that there was deplorable waste in earlier times. The concern has, under proper direction, shown an egregious recuperative power, the latent existence of which in such degree as disclosed was not in quite recent years suspected, we imagine, even by those most intimately acquainted with its affairs.

When it is remembered that, in the second half of 1908, the consumption of gas was practically stationary in comparison with the corresponding period of 1907, and that in the first half of last year the increase was only $\frac{3}{4}$ per cent. compared with the quantity sold during the relative months of 1908, the increase last half year in the sales of $4\frac{3}{4}$ per cent., compared with the quantity sold in the second half of 1908, will be as surprising as it is encouraging. The *raison d'être* for the West Ham amalgamation was that the premier Company required a new outlet for business in an industrial district; and they have it from Jan. 1 this year. But the increase of consumption in the old area in the past half year indicates that conditions have there arisen that have relieved the Company from the dreary monotony of merely marking-time in relation to the gas business. What are those conditions? The Governor will perhaps explain at the meeting on Friday. The half year, regarded climatically, has not in itself been in any sense one that has been abnormally conducive to extended consumption. All that can be seen on the surface is that there has been a tendency to trade revival, there has been cheaper gas in the district, and business in the connecting-up of gas-fires has been proceeding by leaps and bounds. The activity in this respect is best shown by numerical comparison. The gas-stoves sold and let on hire in the half year numbered 35,153, as against 21,723 in the second half of 1908, and 15,387 in the first half of last year. Now there cannot be in three half years an addition of 72,263 gas-stoves to those previously existing without having some effect on the gas—particularly the day—consumption. In view of the magnitude of the Company's operations, and of this ever-extending stove connection, it would be a matter of much interest if the Governor could, in his address to the proprietors, give some account now as to the proportion of gas sent out in the daytime, in contrast with a number of years since. The connections of gas-fires as a notable feature in the expansion of the scope of the Company's business do not stand alone. The consumers enrolled in the half year number 18,497—an increase of 2856 compared with the connections of the corresponding half of 1908. From which information it is clear the department responsible for the gas business has been in a state of perpetual activity; and we can say here, as will doubtless be said at the meeting on Friday—"Well done!" Before proceeding to manufacturing and financial matters, the volume of increase in gas consumption should be mentioned. On a total sale of 11,292,506,000 cubic feet, it was no less than 515,273,000 cubic feet.

In considering the financial results of the half year, there are four points that have to be borne in mind, and which points accentuate the excellence of the figures presented. They are that the price of gas was in the past half year 1d. less than in the corresponding period of 1908, that the revenue account on this occasion bears charges (£13,000) for co-partnership and (£12,000) on account of stamp and conveyance duties under the Act of last year, and that, in addition to setting aside £10,000 towards the redemption fund, a contribution (which did not appear in the second half of 1908) of £10,000 has been made to the insurance fund. Despite these charges, there is a balance of £400,402, against £354,687 twelve months ago, or an increase of £45,715. Adding the balance to the amount brought forward, there is a total sum available for distribution of £810,296, which is larger by £43,311 than twelve months since. The dividend is at the rate of £4 13s. 4d., requiring a sum of £353,302, comparing respectively with £4 10s. 8d. and £343,661. Consequently the balance to carry forward is £456,993, which is better by £33,670—lower price, co-partnership, stamp and conveyance duties, insurance fund, and increased dividend notwithstanding.

The manufacturing department has had a marked effect in improving the fortunes of the concern during recent times; and again the Chief Engineer (Mr. Thomas Goulden) and the technical staff under him have to be congratulated upon their achievements. For the reduction in the price of coal, they cannot take credit; but they can for the improvement in working that gives a larger product from the raw material placed at their disposal, and so yields economy in outlay for the latter as well as for labour. All through the manufacturing charges, though the business was greater, there are reductions, with the exception of the item of repairs and maintenance. The expenditure on coal in the half year, £489,615, is down by £72,340; the outlay on oil, £67,656, is a reduction of £16,224; passing over the few hundreds decrease in coke and breeze and in salaries, the entry for wages, £87,283, is down by £3665, and that for purification, £11,311, by £1372. The item of repairs and maintenance of works is £188,462; being higher by £13,413. The sum of the manufacturing charges, £892,075, is less by £81,091. Incidentally, it is satisfactory to note that the Northern coal troubles have not interfered with satisfactory deliveries to the Company's stations. While on coal, too, it is of interest to observe that residuals yielded £26,394 less than in the second half of 1908—that is to say, £367,516, against £393,910. Nevertheless, the total net cost of coal in the past six months was lower than in the corresponding period of 1908—£122,099, against £168,045. An important contribution to this result is found in the following figures: Although the total quantity of gas manufactured was 12,109,500,000 cubic feet, or an increase of 636,031,000 cubic feet, the amount of coal carbonized, 805,265 tons, was less by 7942 tons than in the corresponding period; the quantity of oil employed, 7,232,568 gallons, was less by 76,368 gallons; and the amount of spirit used, 19,191 gallons, was less by 17,024 gallons. There were reductions all through; and this half year, when working to the prescribed standard of 14 candles will rule, there will no doubt be further substantial differences recorded in the requirement for raw material in relation to gas output. In other respects there is not much else that calls for notice on the

expenditure side of the revenue account. The total of the distribution items, £248,934, works out to about £7000 more; and among the miscellaneous items there are the charges for co-partnership and stamp and conveyance duties already referred to. The outcome in the matter of expenditure is that the total of £1,424,940 is lower by £42,579 than in the corresponding period.

The revenue also shows expansion—the £2,039,524 being a greater total by £12,470; so that, if we add this to the £42,579 reduction in expenditure, we have the amount (£55,049) by which the balance on the revenue account, £614,583, is superior to that of twelve months ago. Glancing down the revenue figures, the reduction in the price of gas has not hindered the Company from, through expansion of business, putting £31,779 on to the receipts from private gas consumption, the total of which was £1,450,395. The price of gas for public lighting has also been reduced; and this, and the raids instigated by municipal ownership of electricity supplies, have caused a recession of £6319 in the receipts from public sources—the total being £68,319. Rental of ordinary meters shows a slight reduction; but rental of gas-stoves, an increase of £3910, and of gas-fittings £10,597. As already mentioned, the income from residuals is down by £26,394. Coke, which realized £228,880, has been the main disturbing factor; having shed some £29,984. Tar and tar products also receded by £3515. But, on the other hand, breeze mounted up by £3907, and ammoniacal liquor and sulphate of ammonia by £3197. To gas manufacture and sales the credit has to be given for an account which fitly closes the final chapter under the old conditions as largely revised in the matter of administration. The new chapter will continue the story of the Company under a largely amended charter.

Increasing Production and Sales in South London.

THERE has not been an occasion, for some time past, on which we have had more pleasure in reviewing the accounts of the South Metropolitan Gas Company than on the present one. The 2s. price which the Company, by strenuous effort, maintained for a considerable period was not always favourable to a fat account, nor to the full dividends to which the proprietors were entitled, though the very lowness of the price (apart from the funds at the back of the Company) had in itself a reserve of strength that was not always appraised at its proper value by the purely investing public. Then, since the price was raised to 2s. 3d. (it is now 2s. 2d.), the Company have, in a measure, in common with other commercial enterprises in their area, been unfortunate in that the trade of the district, speaking generally, has not been in flourishing condition; and there has been besides a perceptible change in the private residential population both by migration and in character. This, in turn, has had its effect on the retail trading element in the composition of the Company's custom. But from general observations in the territory, and from the report and accounts which it will be the pleasure of the Chairman of the Company (Mr. Charles Carpenter) to present to the proprietors on the 9th inst., mutation in these respects appears to have touched bottom; and there are hopeful signs that improvement has already set in.

The varying conditions that have ruled in immediate past years, however, despite the efforts of the distribution staff, have kept the consumption line at a more constant level than a progressively administered Company such as this, with an extensive area and business, cares to see; but the present accounts show that unflagging, spirited work is telling on the conditions for business as they exist. There has been an increase of 4·12 per cent. in the consumption of gas, compared with the corresponding period of 1908. This is highly satisfactory and encouraging, in view of the fact that, in the half year with which comparison is made, there was an actual decrease of 1·7 per cent.; while in the first half of last year, the consumption was practically on an equality with that for the first half of 1908. In volume, the actual increase in the quantity of gas sold last half year is 247,502,000 cubic feet—the total sale having reached 6,253,703,000 cubic feet. We are not disposed to attribute much of the gratifying improvement to the reduction in price from 2s. 3d. to 2s. 2d., as, in respect of price, the consumers in the area fully recognize that they are treated well by the Company. But at the 2s. 2d. price, the dividend to which the proprietors are entitled under the sliding-scale—at the rate of £5 9s. 4d. per cent. per annum—has been earned; and the profits allow of the balance forward being increased by £12,901.

On the same plane in the matter of attractiveness is the tale unfolded by the figures relating to the manufacturing department as to further increase in economies effected through enhanced working result. For the first time, the name of Mr. W. Doig Gibb appears as Chief Engineer on the face of the accounts; and it must be gratifying to him to know that, in respect of his particular department, the accounts have never before presented such a brilliant record as on this occasion. But Mr. Gibb will be the first to acknowledge (he entered upon his new responsibilities in October last) that the credit for the great upward turn in productive excellence is exclusively due to the technical staff (including the Chairman) on the scene before his arrival. The figures are interesting and instructive as to the financial effect of heavier charges and longer duration carbonization. The cost of coal in the half year was £332,081, or £51,038 less than in the corresponding period of 1908. The quantity of coal carbonized was 563,205 tons, or a diminution of 17,570 tons. Yet the amount of gas made was 6,624,378,000 cubic feet, or an increase of 257,330,000 cubic feet; the production being at the rate of 11,762 cubic feet per ton. But this is not the whole tale. In the corresponding period of 1908, the make per ton averaged 10,963 cubic feet, so that the yield last half year was in excess of this by 799 cubic feet per ton; and this 799 cubic feet, multiplied by the tonnage of coal carbonized in the half year, represents 450,000,795 cubic feet. Assuming the make per ton had only been the same as in the second half of 1908—viz., 10,963 cubic feet—to produce the 450,000,795 cubic feet of gas would have required 42,000 tons of coal. A further effect is seen in the carbonizing wages, which item (with an expenditure of £47,902) is down by £7449, representing a reduction of 0·35d. per 1000 cubic feet of gas made. But the fact that there has been this reduction in carbonizing wages does not mean that as wage-payers the Company are on the downgrade; for, as a matter of fact, the total sum paid in wages in the half year was £269,431, which was an increase of £7377 in contrast with the corresponding half of 1908. Therefore, in other directions than carbonizing (adding together the saving in carbonizing wages and the increase in the total wage payment), the Company's business gave an additional wage-earning power of £14,826. Other items under the head of gas manufacture do not call for special notice, except that there has been charged on repairs and maintenance of works in the half year £116,430—an increase of £25,252. But this notwithstanding, the total manufacturing expenses of £520,847 are down by £30,277.

Among other revenue expenditure, it is noticed that the charge for co-partnership is £16,000, or £3000 more, which, we opine, is due to the reduction in price of gas. The distribution charges amount to £144,671, or £9686 more, which is owing to the better and more extended service required by the consumer and for the Company's protection; and, in this respect, the Chairman and Directors of the Company shun anything in the nature of a parsimonious policy, preferring not to rely entirely on lowness of price. We see that the charges for materials and labour under the head of public lamps are not on this occasion compensated so closely as in the corresponding half by the payments of the local authorities. Then the difference between the two was only £765; now it is £4212. We take this to be attributable to the very proper policy the Company are pursuing in gradually bringing the public lighting quite up to date, where they are allowed to do so, by the application of inverted burners. In their public lighting policy is found the secret of their retention of the street lighting; and to-day in their area there are 23,743 incandescent public gas-lamps and only 11 flat-flame ones. The total expenditure on revenue account is £777,695, or a reduction of £12,446.

On the other side of the account, it is seen that the increased sale of gas has not yet recouped the 1d. reduction in price; for, whereas in the December half of 1908, the income from private consumption was £649,340, it was in the past half year, despite the 4·12 per cent. increase, £7609 less. The reduced price and the saving effected by inverted burners also caused a decline of £542 in the public lighting income; the amount received having been £16,565. The figures show the consumers and the public authorities that the concessions, though small per 1000 cubic feet, are, in their aggregate effect, very material ones. On the other hand, the meter and stove rental (£68,806) increased in the half year by £1797. The Company continue to make some

valuable annexations in their business field. The total number of meters fixed is 346,859—an increase, compared with the corresponding half of 1908, of 8500. The number of ordinary stoves is now 78,044—an addition of 863. Slot meter stoves have, by an increased connection of 7413, risen to a total of 195,393; and gas-fires, by an addition of 2686, to 26,516. Regarding residuals, coke has been a disappointing commodity; receipts, £140,096, having receded by £27,655. This is due to the fact that the market taking the surplus has not been favourable; but an endeavour is being made to counteract this by encouraging the more extended use of the fuel in the Metropolis. Receipts for breeze, tar, and sulphate also exhibit declines, but totalling to less than £2500. There are, however, hopes that the income from tar and tar products will improve, in view of the better prices pitch is commanding. The reduction of income from sulphate of ammonia was only £397; and the smallness of the amount is noteworthy in view of the lower quantity of coal carbonized. The total income from residuals was £230,416, which is a reduction of £30,062; and this, as seen, is almost entirely due to coke. Gas-fittings (the item did not appear in the accounts for the December half of 1908) figure among the receipts for £39,518. The issue of the trading is that the total income from all sources is £998,673, or an improvement of £2889, adding which to the lessened expenditure, £12,446, gives £15,335 as the increase in the amount (£220,978) transferred to net revenue account. Complete satisfaction with the state of things presented by the half-year's statement will be the dominant note at the meeting of the proprietors to-morrow week.

Standard Burner Bill and Prospective Opposition.

The Standard Gas-Burner Bills, which are being promoted (under the auspices of the Gas Companies' Protection Association) jointly by 47 Gas Companies, and which refer to 49 gas-supply areas, are growing day by day in importance in relation to the future interests of the gas industry. Though opposition menaces, there must be, at this stage, no thought of withdrawal of the measures. To take such a step would be tantamount to the confession of a weak case, and would be disastrous in respect of future legislative action, whether taken (as hitherto) by individual gas undertakings or in concerted manner as on this occasion. The promoting Companies have a case of extraordinary strength on their side. Parliamentary enactment and precedent are with them right away from the incipient stages of statutory testing for illuminating power; and the conditions of gas supply to-day are entirely in their favour for the granting of what is desired. The Companies must stand shoulder to shoulder in this matter; and there must be a stiffening of backs against any opposition that may be brought to bear on the measures. And, moreover, there should be no concession whatsoever on the part of any single Company having lot in the promotion; for it is clear that concession of any nature by one or more companies might seriously affect when before Committee the interests of the other units in the promotion. That there would be opposition to the Bills was almost a certainty from the time that such a promotion was mooted; but there is nothing more now than then to cause affright. The clear-cut case for the Bills and the single proposal have not altered one iota. That the interested local authorities, through their representatives, held a conference at the Westminster Palace Hotel last Thursday—a conference convened by the Town Clerk of Liverpool—to consider what, if any, aggressive joint action should be taken, is, if anything, favourable to the Bill. Much better is it to have a cut-and-dried case to meet, with only one force supporting it, than for a united body of promoters to have to engage in a sort of guerilla warfare with sundry local authorities. The position in connection with this joint application to Parliament is infinitely superior to that obtaining when the first Sulphur Compounds Bill was promoted; and that Bill came off with flying colours. There is no knowledge—the conference having been *in camera*—as to what, if any, decision or recommendation was come to on the occasion by the delegates of the local authorities concerned; but whatever (if anything) is proposed to be done by them, they must recognize that they are setting themselves the difficult and vain task either of attempting to present a destructive case against constructive and repeated enactment, or of seeking to force the introduction of matter that is altogether irrelevant to the Bill.

The scene of engagement with any opponents will be the House of Lords, inasmuch as Lord Onslow and Mr. Ernest Moon, K.C. (Speaker's Counsel), last Thursday met the Parliamentary Agents for various Bills (in this particular instance, Messrs. R. W. Cooper and Sons), and, among their decisions, allocated the Standard Burner Bill to the House of Lords for first consideration. The Committee to whom it will be referred will not overlook the recommendations of the Board of Trade Committee from which issued the adoption of the Carpenter "Metropolitan" No. 2 burner. Nor will they lose sight of the fact that session after session since 1905 Parliament has been consistent for uniform gas testing, and has prescribed the No. 2 burner in the case of no less than 62 companies and—the local authorities now considering the matter should note this—sixteen local authorities who are suppliers of gas. In addition, several undertakings have been authorized to use the burner by the Board of Trade acting under specific powers conferred by Act or Provisional Order. Upon such a mass of precedent as this Parliament will not now turn. Nor will the Committee fail to heed such considerations as are advanced in a special article printed in the present issue under the title of "The Case "for the Standard Burner Bill," in which incontrovertible argument is brought forward, by an independent expert, both in respect of the compliance by Parliament with the simple and reasonable request of the promoters of the Bills, and of rejection of possible irrelevant demands on the part of any opposition. In plain language, and with a comprehensive grip of historical fact and position generally, our contributor shows that any hostility to the Bill can only be based on a misunderstanding of the position, technical and statutory.

From the precedent of London, statutory prescription in regard to the testing of town gas has always proceeded; and what is being proposed now, and what has been enacted by Parliament in regard to this matter from 1905 onwards, is only of a piece with the basic principle of gas testing, as formulated in the City of London Gas Act of 1868, that the burner used "shall be such as shall be the most suitable "for obtaining from the gas the greatest amount of light, "and be practicable for use by the consumer." The spirit of that principle was continued in the London Gas Act of 1905, and in no way whatever are the Companies who are promoting the Joint Bill transgressing that principle by what they are now seeking. As a matter of fact, had the "Metropolitan" No. 2 burner been developed long since, it would have been obligatory on the part of the Metropolitan Gas Referees to have prescribed it for testing gas in London in substitution for the "London" No. 1 burner, as being a burner that complied with the condition enacted in 1868, and which condition proved the legislative recognition forty years and more ago that it was not within the province of Parliament to determine there and then any finality in relation to the burner to be used for testing. As a matter of fact—as the writer of the article in other columns, with discernment, points out—the fact that the "Metropolitan" No. 2 burner was not invented before has been to the loss of the gas industry through the continuance of a test-burner that was not suitable to the changed conditions of gas supply and use. The present promoters are asking for nothing but that their rights in the matter of testing may be restored to them, as they have been restored by Parliament to the London Companies and to about a tenth of the parliamentary controlled gas undertakings of the United Kingdom, apart from concerns that have had the use of the new burner granted them under the discretionary powers conferred on the Board of Trade by Private Acts and Orders.

With regard to the hints that have circulation as to demands being made by the opposition for the introduction of matter foreign to the single purpose of the Bill, our contributor's article is as destructive of any case that can be put forward in an endeavour to show the justice of such demand as it is of the opposition to the application of a test-burner that scientifically carries out, under current conditions, the spirit and the intentions of the legislative founders of gas-testing in this country. We hope the efforts that have been made by us to show to the local authorities of the towns concerned the weakness of the position they are assuming in this matter will have the effect, if not of entire withdrawal from opposition, of doing something to convince them that they are merely going forward as the champions of a forlorn hope. With such a clear presentment of the position before them, there will be no excuse now for them being, in any manner whatever, deceived in respect of the matter now under their consideration.

Stand-by Clauses in Gas Bills.

We are glad to see there is quite a revival of the stand-by clause or (as in the most up-to-date form it is proper to say) clauses in the Gas Bills that are to be promoted in the first session of the new Parliament. It was a hard fight, prosecuted in several sessions, that led to the insertion in the Heywood and Mountain Ash Acts of last year of protection, carrying the right to levy an annual charge covering the expenses involved in making provision for meeting maximum demands for gas to premises where the supply was merely treated as a stand-by to a private installation of producer or suction gas. In the case of the Heywood Act last session, a second clause appeared, making recompensing provision in like manner where a supply of gas was merely used for the convenience of having a stand-by to an electricity installation. The possession of such powers does not mean compulsory use. They are permissive and protective (as is quite proper), and entirely exercisable at the discretion of those gas suppliers who are fortunate enough to have the power to fall back upon them in case of need. For the sake of their own credit and reputation, no conductors of a gas-supply undertaking would harshly employ such powers; but it is right they should be in the position to collect a fixed annual sum on the expenditure to which they are subject in providing premises with a stand-by supply. And no manufacturer with such convenience could fairly object to the payment of a modest sum as insurance against the breakdown of his private plant, and the interruption of his manufacturing output. Electricity suppliers have had the power to make such an annual charge for several years—and years anterior to those during which gas suppliers were asking the parliamentary authorities to similarly empower them, but, without reason and inconsistently in view of electrical enactment, as regularly declined. But last session a spirit of sweet reasonableness in the matter came over the parliamentary authorities; and, as before remarked, precedents were set in the Heywood and Mountain Ash Acts. In the coming session, the Bristol, Exmouth, and Great Grimsby Gas Companies are asking for stand-by clauses for application where private gas-producing plants are installed. In the Warrington Corporation and Rhondda District Council Bills, similar powers in respect of both gas and electricity are being asked. The Warrington clauses follow literally the Heywood ones of last session, as reproduced from the Act in our issue for Oct. 12. The Rhondda District Council clause is a simple one, covering both gas and electricity, in terms disentitling any person to demand from the Council a supply, or the continuance of a supply, of gas for premises having a supply of gas or electricity from an installation other than that of the Council, unless there is previous agreement to pay the Council such minimum annual sum as will give them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for the premises; the sum payable, in default of agreement, being determined by arbitration as provided by the Arbitration Act, 1889.

"The Times" Cost Controversy.

It is a singular thing that "The Times" should continue to allow one of the contributors to its "Engineering Supple-"ment" to assume such a severely antagonistic attitude towards the gas industry, and to be for ever extolling the hypothetical superior virtues of electric lighting to the detriment of gas lighting. Only recently he made some peculiar and unsupported assertions that are not borne out by the practical experience of the gas industry regarding the relative costs of gas and electric lighting and cognate matters. Against the comparisons and the form they took, Mr. Hanbury Thomas, of Sheffield, protested (see *ante*, p. 247); and this has brought from the "Contributor" a very effeminate sort of reply, composed of the ordinary stock postulations of the electricity industry, with support from that insuppressible Mr. H. H. Holmes, erstwhile Electricity Sales Manager of West Ham, and now (following the translation of his superior, Mr. A. H. Seabrook) the occupant of a like office at Marylebone. These letters are noticed in our "Miscellaneous News," together with a supplement from Mr. Holmes's jealously guarded little store of accounts that show savings (eschewing all other considerations) since the supersession of gas by electricity in certain dwellings. We do not say that by quoting these accounts—unnamed and without address—Mr. Holmes deliberately publishes falsehoods; but we do say that Mr. Holmes is perfectly well aware that those accounts have their antitheses in gas accounts that exhibit considerable savings over displaced electric lighting.

Mr. Holmes knows—perhaps the "Contributor" to "The "Times" does not know so well—that it is possible to obtain a higher illuminating power with gas, preferably by the use of inverted gas-burners, than it is with metallic filament lamps at less cost; but electrical sophists always give the go-by to the well-established fact that conditions that can be obtained at one time with the incandescent gas-burner can be quite easily maintained. The redoubtable but unconvincing Mr. Holmes has never been able to deny that it is possible at a given price to obtain a far greater illuminating power by incandescent gas-burners than by metallic filaments, nor has he been able to deny that it is not impossible readily to maintain that illuminating power. He is fully conscious of the fact that, if he did so deny, he would be deliberately putting himself in a cleft stick; and Mr. Holmes, bold as he is at advertisement, is too cute to act so foolishly. The figures he quotes in "The Times" are some of the old West Ham stock, with electricity at 3d. per unit. He merely gives the bare figures, without any information as to hours of lighting, types of burners used, and illuminating power afforded. A large-hearted credence remains with him as a glorious characteristic and valuable asset in his work as a Sales Manager. The consumers say that they get as much light under the new order of things as under the old. Mr. Holmes is satisfied. If true, then the consumers referred to ought to be ashamed of themselves for their neglect of a small duty that would have repaid them in abundance.

But, in face of these accounts, what has Mr. Holmes to say to the statement of Mr. Herbert N. Clark, of West Ham, in his paper before the Southern District Gas Association last November, that "in many cases the Gas Com-"pany have reclaimed and converted back to gas consumers "of electricity." One large installation of high-pressure lighting was also described in that paper, upon which the remark was made: "A better light has been obtained at "considerably less than half the cost than when the electric "light was used." Is there any absurdity in these claims? No; the absurdity rests with the electricians in ignoring what is possible and what is actually attained with gas, and in presenting statements supported by a foundation composed of the fiction of their imaginations and of consumers' accounts that are not representative of the general experience. We should strongly advise "The Times" "Contributor" to pay a little more attention to modern gas-lighting developments before he again writes at large on the subject of light diffusion and concentration by the opposing lamps. And it would not be amiss if he did not cling too tenaciously to the trite arguments that were originated in electrical commercial circles.

Right to Open Streets in New York.

In another part of the "Journal" will be found some extracts from a judgment given by the Appellate Division of the Supreme Court in New York in an action between the authorities of the City and the New York Mutual Gas Company in regard to the right of the Company to open streets for laying their mains. The Company obtained in 1866 their power to manufacture and supply gas, and it was granted with the provision that no street or highway was to be opened without the consent of the municipal authority. This, however, might be dispensed with if the majority of the parties interested in the property adjacent to the part of the street proposed to be opened gave their consent in writing to the work being done. In 1868, the Board of Aldermen approved a resolution giving the Company permission to supply gas in the city for a period of thirty years subject to certain conditions which had been imposed upon two neighbouring Gas Companies. At the expiration of the above-named period, the Company continued their operations without obtaining municipal authority; and this, it was alleged, they had no right to do. The plaintiffs not only asked for an injunction to restrain the defendants from continuing to open the streets, but also for an order for the removal of the mains "with all convenient speed." The Company submitted a complete answer to the allegations of the plaintiffs, who, however, demurred to it on the ground of insufficiency. The Lower Court overruled the demurrer; and the plaintiffs

appealed, without success—the five Judges in the Appeal Court being all in favour of the Company. They went back to a General Act passed in 1848 to sanction the formation of gas companies—a measure akin to our Gas-Works Clauses Act of the preceding year—and decided that it gave the Company a perpetual franchise, subject only to permission being obtained to open the streets. This having been granted and acted upon, the Court decided that "the power to continue was a necessary incident of the franchise granted by the State, and not subject to interference or revocation by the local authority." Though the case is mainly of interest to the parties specially concerned, it is not the less worthy of attention as an example of attempted interference by a local authority with the owners of a large undertaking carrying on their operations under legislative sanction, being very properly frustrated. The State is higher than the Municipality.

Successful and Unsuccessful.

So far as known at the time of our last issue, the Members of the new Parliament and the unsuccessful candidates for seats who are identified with the gas industry were named in an article appearing on p. 222. There are a few additional names to be noted this week—all but one those of men who have been successful in their candidature. Sir Fortescue Flannery, one of the Directors of the South Suburban Gas Company, wrested from the Liberals for the Unionists, by a majority of 869 votes, the Maldon Division of Essex. The Right Hon. J. E. Ellis, a Director of the Scarborough Gas Company, held for the Liberal Party, by the substantial majority of 2844, the Rushcliffe Division of Nottinghamshire. Alderman N. W. Helme, the Chairman of the Lancaster Corporation Gas Committee, has, by an increased majority, been returned for the third time for Lancashire North. Mr. W. H. Cowan, contesting Aberdeenshire East in the Liberal interest, walked home with at his back the solid majority of 2638. By a reduced majority, Sir W. J. Crossley, one of the founders of Messrs. Crossley Bros., retained the Altrincham Division of Cheshire for the Liberals. By only 66 votes, Alderman W. F. Cotton, the Chairman of the Alliance and Dublin Consumers' Gas Company, was defeated, in running as a Nationalist for Dublin South in opposition to a Unionist. The Unionist majority in 1906 was 1343; so that Alderman Cotton has the consolation of knowing that, though unsuccessful in capturing the seat, he gave his opponent a severe shaking.

District Council Finances.

Though, as is only natural, the finances of the Urban District Councils are on a smaller scale than those of the Borough Councils, it will nevertheless be gathered, from a perusal of the figures which appear on another page of to-day's issue, that in the aggregate their monetary transactions are of very considerable magnitude. The Blue-Books which deal with the two sets of authorities are, as far as is practicable, modelled on the same lines; but in the case of the District Councils there is an omission of one table which has on the last few occasions proved of much interest in connection with the statistics compiled with regard to the finances of the Borough Councils—that is, the table showing the transfers that have been made in aid of rates out of profits from, and the transfers from the rates to make up deficiencies in revenue on account of, the "reproductive" undertakings. At March, 1907, there were 326 boroughs (exclusive of the Metropolis), while the number of urban district councils was 811; but whereas the rateable value of the former was £73,265,136, that of the latter was only £31,804,974. There is even greater difference perceivable when the total amount of loans outstanding is taken into consideration; for in the case of the borough councils the figure is over £244,000,000, while in that of the urban district councils it is no more than £35,622,307. Of course, many items comprised in these loans are the same in both instances; and of the sum owing by the urban district councils 24·1 per cent. is for purposes of sewerage and sewage disposal, 15·5 per cent. for water-works, 9·7 per cent. for gas-works, 10·4 per cent. for education, 8·2 per cent. for street improvements, 6·6 per cent. for electric lighting, 5·7 per cent. for tramways and light railways. Altogether the loans outstanding in respect of undertakings which yield revenue and for works of private improvement (and which amount is recoverable) represent, in the case of the district councils, just 40·5 per cent. of the total debt. Of the receipts of these councils for the year 1906-7, the amount raised by means of public rates accounts for 54·5 per cent.; while the receipts from revenue producing undertakings and private improvements represent rather more than 23·8 per cent. of the total income. It would not be fair, in comparing the figures relating to local governing authorities as now available with those published some years ago, to neglect to take into account the important influence which is now exercised on the finances by the item of "education." In 1906-7, the district councils had loans outstanding of £3,552,280 in respect of elementary education; whereas in 1902-3 no amount at all appeared under this heading. In the intervening period, the total increase of loans has been some £7,500,000, which leaves, in round figures, an addition of only £4,000,000 to be accounted for in other directions than education. Nearly £1,000,000 of this has been in respect of electric lighting; while tramways and light railways are responsible for some £1,250,000. Gas-works, on the other hand, have only increased outstanding loans in the same period by about £200,000, and water-works by some £400,000. The average amount in the pound of the rates received by the district councils (other than for purposes of elementary education) has varied but little recently—the figure for some years past having been in the neighbourhood of 3s. 3d. in the pound; but, it must be borne in mind that, in addition to this, elementary education is responsible for rates amounting to about another 1s. 3½d. in the pound.

Personal.

Mr. J. A. WITTEN, the Engineer and Manager of the Gorleston and Southtown Gas Company, recently underwent a serious operation; but his friends will be pleased to learn that he has now so far recovered as to be able to go to Bournemouth to recruit his health.

Mr. JOHN PIRIE, who has for many years been associated with the "JOURNAL" as its Edinburgh Correspondent, and who is personally known to most of our readers north of the Tweed, has recently been installed President of the Edinburgh Working Men's Club and Institute.

Obituary.

The "Journal für Gasbeleuchtung" reports that the death occurred recently of Herr F. DEBACH, who, after being associated in various capacities with the Stuttgart gas undertaking from 1863, was appointed its Manager in 1893. He resigned that position in 1906 owing to failing health and strength. He was born in 1846.

Mr. JOHN LEARMONT died last Tuesday at the residence of his son at Rockbank House, Milngavie. Mr. Learmont was one of the oldest gas managers in Scotland—in his 89th year. He was trained as an agriculturist on his father's farm in Wigtownshire; but his life-work was the making of gas. He was connected with the industry for sixty years, first at Eaglesham and afterwards at Milngavie. At the inception of the West of Scotland Association of Gas Managers, he was appointed Secretary, and in this capacity was well known to his colleagues in the West of Scotland. He had not for many years before his death taken part in public business in connection with gas supply.

Presentation to Mr. G. F. L. Foulger.

In the lecture-room at the offices of the Gaslight and Coke Company, Mare Street, Hackney, on Monday last week, Mr. G. F. L. Foulger was the recipient of a testimonial from the employees in the distribution, chief inspector's, and stove and meter departments. It took the form of a massive Georgian pattern silver tea and coffee service, spoons, and sugar-tongs, in a polished oak case, with an illuminated address, inscribed as follows:—

> **The Officers and Workmen of the Distribution, Chief Inspector's, and Stove and Meter Departments of the Gaslight and Coke Company, in expressing their deep regret at the cause of Mr. G. F. L. Foulger's retirement from the position of Distributing Engineer to the Company, ask his acceptance of a silver tea and coffee service, as a slight token of their esteem and gratitude for the kindness and solicitude for their welfare shown by him throughout his distinguished career. January, 1910.**

The presentation was made by Mr. Foulger's successor, Mr. H. S. Reeson, who was supported by the Company's Chief Inspector, Mr. F. W. Goodenough. Mr. Foulger thanked the subscribers sincerely for their gift, which he said would always remind him of the happy time he had spent in the service of the Company, especially in connection with the distribution department. He assured the subscribers that he should always appreciate it, apart from its intrinsic value, as an indication of the goodwill extended to him by all his staff. On the same occasion, Mr. Foulger was asked to accept, on behalf of Mrs. Foulger, a gold flexible bracelet in a case; and he expressed his thanks to the subscribers. All present were extremely gratified to find Mr. Foulger looking very well.

THE CASE FOR THE STANDARD BURNER BILL.

[Communicated Article.]

The three Bills in identical terms which are being jointly promoted by 47 Gas Companies, representing 49 undertakings, in the United Kingdom, with the object of providing for the adoption of the "Metropolitan" argand burner No. 2 for the statutory testings of the illuminating power of the gas supplied by the Companies, have been threatened with opposition by certain local authorities whose districts are included in the area of supply of one or other of the promoting Companies. This opposition appears to have arisen mainly from misunderstanding of the object of the Bills, and of the effect of their provisions. The following communication has been prepared with a view to the removal of such misunderstanding where it exists; and as the author is independent of any of the promoting Companies or other gas undertakings and of any local authority, his comments may very properly be regarded as emanating from an impartial expert.

The three Bills will, for convenience, be spoken of in the sequel as the joint "Bill," because they were originally one; and the division into three was made at the request of the authorities of the House, owing to the large number of Companies concerned. The provisions of the Bill were stated fully in the "Journal" for Dec. 21 last (page 823). Briefly they are that, from Jan. 1 next, the "Metropolitan" argand burner No. 2 shall be used in statutory testings of the illuminating power of the gas supplied, in place of whatever standard burner is now prescribed in the Special Act or Order of each of the promoting Companies. The Bill states the conditions to be observed in the testings with this burner—they are substantially identical with those now observed in London under the prescription of the Metropolitan Gas Referees. Power is reserved to the Board of Trade to approve the use of another burner in place of the "Metropolitan" argand burner No. 2, in order that, if an improvement on the latter is subsequently available, it may be adopted without the necessity of a further appeal to Parliament. As will be seen later, this provision in effect means that, if the Metropolitan Gas Referees, who are appointed by the Board of Trade, find it their duty, under the London Gas Acts, to prescribe at some later date another standard burner for the testing of gas in London, that burner will automatically become available for testing the gas supplied by the promoting Companies.

The question of the proper burner for use in statutory testings of the illuminating power of gas will be better followed if the history of the inception and development of such testings is known. Briefly, a standard of illuminating power and provision for testing were first enacted in Great Britain in the Metropolis Gas Act, 1860, which Act applied only to certain Companies then supplying gas in the Metropolis. The standard thereby fixed for common gas was 12 candles; and the burner to be used in testing was an argand having 15 holes and a 7-inch chimney, consuming 5 cubic feet of gas an hour. These provisions remained applicable until the City of London Gas Act, 1868, came into force in regard to Companies then supplying gas in the City of London. This Act required the Gas Referees to prescribe the burner for testing the illuminating power of the gas; and "it shall be such as shall be the most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer." It may be reasonably assumed that it was tacitly admitted at the date of passing of this Act that the 15-hole argand with 7-inch chimney prescribed in the Act of 1860 was not the most suitable burner for obtaining from the gas the greatest amount of light. It was known that the Gas Referees would have no difficulty in prescribing a burner affording a higher illuminating duty from gas consumed in it at the rate of 5 cubic feet per hour. By way of compensation, therefore, the 1868 Act forthwith required the gas supplied to be of an illuminating power of 14 candles when tested by the aforesaid most suitable burner for obtaining from the gas the greatest amount of light. The burner prescribed by the Gas Referees on March 31, 1869, in pursuance of this requirement of the 1868 Act, was Sugg's "London" argand No. 1, which the Referees reported gave 16 per cent. more light from the same gas than the earlier 15-hole testing-burner. Sugg's "London" argand No. 1 was accepted then, and for many years later, as the most suitable burner for obtaining from the gas the greatest amount of light. But if a more suitable burner for the purpose, such as the "Metropolitan" argand burner No. 2, had then been known, the Gas Referees *would have been bound to prescribe it for testing the gas* which, by the 1868 Act, was required to be of an illuminating power of 14 candles. Owing to the "Metropolitan" argand burner, No. 2 not having been devised until a recent date, the Companies supplying gas in the City of London from Sept. 30, 1868, onwards, and other Metropolitan Companies from a later date, were compelled, by the prescription of the Gas Referees, to supply gas of a higher illuminating power than was really necessary to fulfil the requirement as to quality embodied in the 1868 Act. Thus, due to the failure of the early Gas Referees to find a more suitable burner than Sugg's "London" argand No. 1 for obtaining from the gas the greatest amount of light, the London Gas Companies, in the first instance, and indirectly, as will be shown later, the majority of the Provincial Gas Companies also, were unable to secure the full benefit of the early legislative provisions in regard to the quality of the gas supplied. The intentions of the legislators were frustrated by the action of the early Gas Referees, who, with the best possible aims, thereby did the gas industry lasting injury.

The object of the present joint Bill is to restore to a number of Gas Companies the rights in regard to the testing of the quality of gas which the early gas legislation conferred on the London Gas Companies, but which later legislation, inspired by the action of the early Gas Referees, took away from them. The "London" argand burner No. 1 was believed in March, 1869, when it was first prescribed for testing the quality of gas which was required to have an illuminating power of 14 candles, to be the most suitable burner for obtaining from the gas the greatest amount of light. In 1870, certain Metropolitan Companies were required to supply gas of 16-candle power, and others gas of 14-candle power. Suggs's "London" argand No. 1 burner was prescribed for testing both qualities of gas; the only difference being that a wider chimney had to be used for the richer gas. This prescription was made by the Gas Referees according to the clause of the 1868 Act, and two identical clauses in Acts of 1869 relating to other Metropolitan Gas Companies; so that it may be admitted that in 1870 Sugg's "London" argand No. 1 burner was believed to be the most suitable burner for obtaining the greatest amount of light from both 14-candle power and 16-candle power gas. In 1871, the Gas-Works Clauses Act Amendment Act was passed, The testing provisions of this Act apply to the majority of gas undertakings outside the Metropolis proper. In regard to testing for illuminating power, they require that the gas shall be consumed at the rate of 5 cubic feet per hour in a burner such as shall be prescribed in the Special Act or Order of the gas undertaking. In the vast majority of the Acts and Orders of provincial gas undertakings passed or granted after the passing of the Gas-Works Clauses Act Amendment Act until a quite recent date, the prescribed burner for gas required to be of an illuminating power of 14, 15, or 16 candles was Sugg's "London" argand No. 1. It was currently believed that this burner, owing to its prescription in the Metropolis for both 14 and 16 candle power gas under the provisions of the Acts of 1868 and 1869 was, in fact, the burner "most suitable for obtaining from the gas the greatest amount of light." Had a burner more suitable for the purpose been devised at that date, the Gas Referees would have been compelled, in fulfilment of their duty, to prescribe it for London in place of Sugg's "London" argand No. 1; and the more suitable burner would then have been prescribed in the Acts and Orders of provincial gas undertakings after the passing of the Gas-Works Clauses Act Amendment Act, 1871, just as, in fact, London precedent has been followed in the vast majority of these Acts and Orders in which Sugg's "London" argand No. 1 is the prescribed burner. The spirit of the legislation embodied in these Acts and Orders in regard to the testing of illuminating power was clearly that the gas undertakings had the right to have their gas tested by the burner which was most suitable for obtaining from the gas the greatest amount of light.

Improvement on Sugg's "London" argand No. 1 burner in this direction was not thought to be possible in the seventies; and hence it came about that in 1875 the burner which had hitherto been prescribed by the Gas Referees, under the 1868 and 1869 Acts, was specifically named in the Commercial Gas Act, 1875, as the burner for testing the illuminating power of the gas of the Commercial Gas Company. This unfortunate precedent was followed in other London Gas Acts in 1876, and the clauses of the 1868 and 1869 Acts requiring the Gas Referees to prescribe for testing the burner which was most suitable for obtaining from the gas the greatest amount of light, were repealed. Undoubtedly, however, it was universally accepted, at the time, that Sugg's "London" argand No. 1 burner complied, and would continue to comply, with that condition. When it became known in 1905 that other burners afforded a greater amount of light from the gas than Sugg's "London" argand No. 1, Parliament in the London Gas Act of that year, again placed on the Gas Referees the obligation to prescribe the burner for testing the illuminating power of the gas supplied by the Metropolitan Gas Companies, subject to the condition that: "The burner so prescribed shall be of such a pattern (not being an incandescent or similar burner) as shall be practicable for use by the consumer; and the burner and the chimney (if any) shall be the most suitable for obtaining, and in making the test shall be so used as to obtain, from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light." The requirement of the 1868 and 1869 Acts was thus again revived, with the addition of safeguards as to the chimney and mode of using the burner. The burner prescribed by the Gas Referees, in accordance with this requirement of the Act, for testing the gas supplied by the three Metropolitan Gas Companies is the "Metropolitan" argand burner No. 2. It has since been prescribed in the Acts and Orders of a number of provincial gas undertakings; and the present Gas Companies (Standard Burner) Bill seeks to extend its prescription to the gas supplied by all the promoting Companies. That is to say, that just as Parliament in 1871 and subsequent years, in the Gas-Works Clauses Act Amendment Act, and an immense number of Private Gas Acts and Orders, adopted for provincial gas undertakings generally the provisions of the 1868 and 1869

Acts, and the prescription of the Gas Referees consequent thereon, in regard to the burner to be used for testing the gas supplied by the Metropolitan Gas Companies, so now Parliament is asked through the present Bill, to extend to a number of provincial gas undertakings the precisely similar provision of the London Gas Act, 1905, and the prescription of the Gas Referees consequent thereon. *If precedent in gas legislation counts for aught, the Bill should certainly and justly receive assent by Parliament.*

The foregoing historical review shows that the promoting Companies are merely asking to have restored to them the just and only defensible method of testing the illuminating power of gas, which was initiated by Parliament in 1868; and after being more or less in abeyance from 1876 to 1905, was in the latter year restored to the Metropolitan Gas Companies. That it was ever in abeyance has been shown to have been due to a misunderstanding, and to the impression, since known to be false, that finality had been reached by 1875 in the construction of argand burners. Parliament is now asked to remove the injustice inadvertently inflicted by it in regard to testing the illuminating power of their gas under which the promoting Companies have laboured for, in some cases, over thirty years.

Now that it has been shown that, on precedent, the promoting Companies have a right to their Bill, it is worth while to consider briefly some of the objections which are being raised to it in the Councils of a few of the local authorities concerned. The Town Councils of Reading, Plymouth, Cambridge, and Croydon, and the Wandsworth Borough Council, have all indicated opposition to the Bill [*vide* "JOURNAL," Vol. CVIII., p. 688, and *ante* pp. 57, 111, 186, and 188]. Moreover, on Thursday last a meeting, convened by the Town Clerk of Liverpool, of the various Local Authorities of the towns and districts supplied with gas by the promoting Companies, was held at the Westminster Palace Hotel, in London. As this meeting was private, no information is available as to what transpired. The chief grounds of opposition, however, brought forward in the meetings of the Councils enumerated above may be summarized as follows:

(1) That the "Metropolitan" argand burner No. 2 obtains from the gas a greater amount of light than the burners now prescribed for testing the illuminating power of the gas supplied by the various promoting Companies.

(2) That, as a consequence, the Companies will be able to effect a reduction in the quality of the gas, though the prescribed illuminating power remains unaltered.

(3) That a reduction in the quality of gas, as measured by the statutory testings for illuminating power entails a reduction in the illuminating duty obtainable from the gas when burned in flat-flame burners vastly in excess of the reduction in quality, and that therefore the consumers' interests are prejudicially affected to a much greater extent than the reduction directly implies.

In addition to the foregoing objections, which are directly raised by the proposals embodied in the Bill, advantage may, it is suggested, be taken of its promotion to ask for the inclusion in it of provisions for the following objects, which (it may be parenthetically remarked) are totally irrelevant matters:

(4) That, having regard to the general use of incandescent burners for lighting, and to the extended employment of gas for heating and power purposes, for all of which uses the illuminating power of the gas is of no moment, whereas its calorific power is of importance, a standard calorific power of the gas should be fixed, and provisions for the making of testings of calorific power should be included in the Bill.

(5) That, as the consumption of gas does not now to such a great extent as formerly take place in the evening hours, the testing of the gas for quality should be permitted at other times instead of, as now, only in the evening.

(6) That a limitation should be imposed as to the (maximum ?) pressure at which gas may be supplied.

(7) That sulphur restriction clauses should be re-enacted—*i.e.*, that, in addition to the existing requirement that the gas supplied must be free from sulphuretted hydrogen, a maximum limit should be fixed for the proportion of other sulphur compounds contained in the gas.

(8) That the method and apparatus used for testing the illuminating power (and the calorific power if a standard of calorific power is imposed) should be those prescribed from time to time in the Notification of the Metropolitan Gas Referees.

It will be seen from this summary of the main grounds of opposition to the Bill that there is some prospect of it being assailed from many and widely divergent points. Some of the questions which enthusiastic but misguided or ill-informed opponents would raise are, however, so remote from the object of the Bill that it is difficult to regard them as being brought up seriously in connection with it. The first three points may, however, not unreasonably be thought to afford ground for legitimate opposition to the Bill if they can be supported by trustworthy evidence. Consequently, it will be useful at the present juncture to discuss them somewhat fully.

In regard to the first point—viz., that the "Metropolitan" argand burner No. 2 obtains from the gas a greater amount of light than the burners which the Bill proposes it should supersede, this may be admitted as generally true. Precisely how much more light is afforded by it depends on the candle-power and nature of the gas, and on the efficiency of the burner now prescribed in each Special Act or Order. But the difference is often substantial, especially when the gas supplied contains an appreciable proportion of carburetted water gas. It must be remembered that Sugg's "London" argand No. 1 and other early standard burners were devised for the consumption of coal gas such as was made about 1870. The dimensions of the parts of the "London" argand No. 1 were chosen by the late Mr. William Sugg, to the best of his ability, with a view to supplying the requisite amount of air to a flame of such gas. It may be unhesitatingly asserted that he would have chosen other dimensions for parts of the burner if the gas for which he had to design it had been such as is now commonly supplied. The "Metropolitan" argand burner No. 2 has, to the best of present-day knowledge, the requisite dimensions, coupled with means of adjusting the air supply, for the consumption of gas as now made. *It is obviously unfair to burn this gas in a burner designed forty years ago for the gas of that period.* Consumers' burners have changed enormously in the meantime; and the Gas Companies are entitled to claim that the standard burner by which the gas is tested should not be one which is ancient and obsolete. It has already been clearly shown that Parliament intended, when gas legislation in respect of the quality of the gas supplied was initiated, that the gas undertakings should have the benefit of the most suitable burner for obtaining from the gas the greatest amount of light, and thereby should share with their customers the advantages accruing from improvements in burner design. Parliament has in 1905 again disclosed the same intention, by re-granting to the Metropolitan Gas Companies the right, which they possessed from 1868 to 1876, to the use of the most efficient burner for the testing of their gas. *The Companies promoting the present Bill merely ask Parliament for the same measure of justice that the Metropolitan Gas Companies now have.* There is no reasonable ground for fear that the provisions of the Bill, if enacted, will result in the consumer being detrimentally affected by any slight falling off in the illuminating power of the gas. If it were admitted, however, that in a few cases a consumer might be slightly aggrieved thereby, it must be remembered that, on the other hand, the Companies have for over thirty years been subjected to harsher methods of determining the illuminating power of their gas than Parliament originally contemplated, and that presumably the consumer has been benefiting throughout this long period at their expense. They now ask that an end be put to the injustice from which they have suffered for so long.

(To be continued.)

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 315.)

THE Stock Exchange has not had a very bright week. Business was quiet, and there was a rather heavy account to be adjusted. The tone almost throughout had a dull tendency. Consols on Friday touched 82. The factors producing a lowering effect were manifold. Too sanguine views regarding the elections had been widely entertained, and disappointment was experienced that the returns (good as they were) were not better; the grave calamity which has befallen Paris had a sinister influence upon markets popular in the Bourse; and there were other minor causes. The week started unpromisingly on Monday. There was a disposition to close open accounts, and prices for the most part were easier. Tuesday was dull also. Gilt-edged securities were irregular, and Consols were rather lower. Business was inactive on Wednesday; and markets, with few exceptions, were weaker. Consols fell $\frac{3}{16}$. Thursday continued dull, and the leading departments failed to cheer up. Friday produced no change in the general attitude. Consols were at their lowest (falling another $\frac{3}{16}$); and only in the speculative markets was there any brightness. On Saturday, there was a very slight recovery in the higher lines. Consols had a little rise, and rails were stronger; but most of the rest were uneven. In the Money Market, there was a good demand for the Stock Exchange which helped to put a stiffening into rates; but after the settlement was over, they relaxed materially. Business in the Gas Market was more active, and there were some nice rises (moderate, and not jerky) in many quotations. The half-yearly accounts are beginning to come out, and from those already to hand it is evident gas has been in good demand, and (speaking generally) the weakness of the coke market is the only "regrettable incident." In Gaslight and Coke issues, the ordinary was in excellent favour. Opening at $104\frac{3}{4}$, it worked up to $105\frac{3}{4}$—the closing mark, and a rise of a point. In the secured issues, the maximum was $\frac{1}{2}$ better, at $89\frac{3}{8}$; the preference made from $104\frac{1}{2}$ to $104\frac{5}{8}$; and the debenture $82\frac{1}{4}$ and $82\frac{1}{2}$. South Metropolitan was quiet at from 121 free to 122; and the debenture marked $82\frac{1}{4}$ and $82\frac{1}{2}$. Commercial 4 per cent. was done at 111, and the 3 per cent. at 105—a rise of 1. Among the Suburban and Provincial group, Brentford new made 190, Brighton original 219 and $219\frac{1}{4}$, Ilford "A" 146 and $146\frac{1}{2}$, Tottenham "B" $112\frac{1}{4}$ (a rise of 1), Chester 110, and Sheffield 234. In the Continental Companies, European fully-paid changed hands at $24\frac{9}{16}$ and $24\frac{7}{8}$ *cum div.*, Imperial at from 175 to $176\frac{1}{2}$, ditto debenture at $94\frac{1}{2}$, and Tuscan at $9\frac{7}{16}$ and $9\frac{1}{2}$. Among the undertakings of the remoter world, Buenos Ayres was marked at $14\frac{1}{2}$, ditto debenture at $98\frac{1}{2}$, Cape Town preference at $5\frac{11}{32}$, Melbourne $4\frac{1}{2}$ per cent. at $101\frac{3}{4}$, Primitiva at $7\frac{1}{8}$ and $7\frac{1}{4}$, ditto preference at from $5\frac{7}{32}$ to $5\frac{3}{8}$, ditto debenture at $98\frac{3}{4}$, and River Plate at $17\frac{1}{8}$.

ELECTRICITY SUPPLY MEMORANDA.

Fixed Lighting Prices for Working-Class Householders—Hypotheses—Weaknesses of the Fixed Price System—Cold Weather and Heating—Safety and Rules.

To the making by our electrical friends of fantastic schemes for capturing the custom of the working-class householder, there is no end. The fact that there has been a long succession of such projects sufficiently certifies the ineffectiveness, up to the immediate predecessor of the newest invention, of those that have gone before. Weaklings they have all been; and they now rest in peace. A new idea, however, has given our contemporaries something to talk about in this particular line; but it is a scheme that, we venture, on a long experience of the working-class consumer, to think is doomed to disappointing results for the originators. The project is feeble and uninviting in every particular; and it has our deepest sympathy. The wiring problem, in obtaining the working-class householder as a consumer of electricity, is undoubtedly an imposing one; but it is not the only one. It seems, however, to be considered the main one by a new venture called the Fixed Price Light Company, Limited, which owes its existence to Messrs. Siemens Bros. and Co., who have made use of a recent proposal of Messrs. Handcock and Dykes. The title of the new venture, in which we do not understand our electrical contemporaries are going to invest any of their surplus cash, discloses the principal feature of the scheme. The idea is to provide light at a fixed price per lamp per quarter, by arrangements made through four parties—the Fixed Price Company, the local electricity suppliers, the landlord, and the tenant. The fixed price is to include both wiring and light (from metallic filament lamps varying from 25 to 12 candles), but not lamp renewals. The consumer is expected to have not less than three rooms lighted. The weekly charges are to be 2½d. per lamp per week from April 1 to Sept. 30, and 3½d. per week from Oct. 1 to March 31. Of course, no meters are to be used; and "Stannos" wiring is the means by which cheap installation is to be obtained. It appears from the prices quoted that the charges are to be uniform whether a 25-candle or a 12-candle lamp is employed; and it may be supposed that in the decision as to the quantity of illumination required the Fixed Price Company is to be the sole arbiter. Fancy a 25 or a 12 candle light, in these days of cheap incandescent gas-burners, in any room of a workman's house at 3½d. to 2½d. per week! Poor people! Anything is electrically reckoned good enough for them. Consider, too, a man with a family earning (say) 25s. a week, living in a house containing five or six rooms, and requiring a light in each being called upon to pay week in week out for poor lighting only (without cooking) 1s. 6d. or 1s. 9d. per week in winter, and 1s. or 1s. 3d. in summer; and on top of this the cost of lamp renewals.

This is thought to be a project of competitive ability with the slot gas-meter system. The electricians have to become better acquainted with the working man, with his requirements, with his monetary capacity, and with his views as to obtaining value for his money. It is plain they know little of him as yet. Our friends of the "Electrician" are amusing when dealing with this subject. Assertion pours out; but either proof or figures in support are conspicuous by their absence. From the one little descriptive article in our contemporary, we will extract these gems of hypothesis: "The problem has been partially solved by the fact that, under suitable conditions of lighting, the metal filament lamp competes successfully with the incandescent gas mantle." [We are not told whether the suitable conditions exist in workmen's dwellings.] Then, again, "these prices [those previously named] work out at *considerably* less than the cost of gas on the slot-meter system, which is almost universally employed in the district in question"—that is, in the Rotherhithe New Road (where business is to be commenced by the infant Company), which is situated in the cheap-gas district of the South Metropolitan Gas Company. Still further: "The excellent lighting obtained with the Tantalum lamps, compared with that in similar houses where gas is in use, is most marked; and there should be a great demand in the neighbourhood for the 'new' light, particularly as it can be shown to be cheaper than gas." Let the "Electrician" proceed to show it then. In a leadcrette on the subject, our contemporary also states: "There is no doubt that in practically all cases a much better light will be provided than with the usual gas-fittings; also—what is likely to be an important factor—at a lower cost than in the case of gas." There can be no doubt after these repeated declarations that our friends really believe what they say; and so the grounds of their belief would assuredly be as interesting to their readers as they would be to us. But the grounds are safely kept hidden. For this, perhaps refuge will again be taken, as a few weeks since, in the "Industrial Supplement," in that hackneyed phrase of evasion "figures can be made to prove anything."

After this little digression, let us return to the examination of the scheme. There is to be no check on the consumer other than his bare word, and the necessity for lamp renewals. The consumer, we read, will be expected to use his light reasonably and without waste; and in order to control him in this respect, the Company have decided not to include the supply of new lamps in his weekly rental, but to make the consumer pay for these. We admire this absolute abandonment to complete reliance in human nature. In gas supply, the working class householder is catered for through the prepayment meter. The most wasteful and careless are the best paying section of this class of consumer; but it is only through the meters that they pay for their wastefulness and carelessness. There is a weakness in this respect in the fixed-price-per-point-of-lighting system. Another defect is that it is proposed that the lighting rental shall be collected by the landlord with the weekly rent for the dwelling. A landlord will not be prepared to jeopardize the letting of his property by having a charge foreign to the rent of the property tacked upon it for the benefit of other people, nor will he care for the responsibility of making the collection. In the winter months particularly, when the charge for lighting will be the heaviest, landlords of small property have already trouble enough to get in their rents without having an excess charge to collect. Still another defect of the system is that it does not provide for cooking and boiling as does the slot gas-meter system; and the working-class householder has to give up these conveniences unless he is prepared to enter into business relations with both the Fixed Price Company and the Gas Company. He will not do that. Another drawback of the system is that the small householder will in some cases be a difficult customer to deal with in the event of failure of supply. With him rights are rights. He must also be educated up to providing stand-by candles or else oil-lamps (which will mean further expense to him), in order to be prepared for collapses of the supply of current and of lamps. The cost of the replacement of metallic filament lamps will also be a source of worry and friction. Did someone ask the span of life we were prepared to predict for the Fixed Price Company? If so, we cannot give an answer. But there are grave doubts as to it being a long one, though in places hopes are trying to flourish on the ground that "the prices to be charged work out at considerably less than the cost of gas on the slot-meter system."

The cold snap of last week compelled one's thoughts to turn to the question of heating. It is such days as those we had (say) on Wednesday and Thursday of last week that cause people who have adopted electrical radiators to find out their great defect of inefficiency as heating agents, and to determine upon a change at the earliest possible moment. Sharp weather of the kind does as much good for gas companies in the competition for heating business as any factor that can be named, not even excepting expense. For it is only those to whom expense is no object who would dream of putting in electric radiators; and many of these, when the thermometer is low, and they are sitting in rooms that are supposed to be heated (this is an age of terminological inexactitudes) by electric radiators, physically realize the deception, and determine to transfer their patronage to gas. This has been a good season for the fitting of gas-fires; but, so far as we can gather, a bad one for electric radiators. People are finding them out; and their reputation as bad and unprofitable servants becomes accentuated with time, and spreads vigorously. That all refers to domestic heating. In large premises such as warehouses, halls, and churches, where electricity is used for lighting purposes, it is found that the former heating arrangements are no longer sufficient, and that something different must be adopted at considerable cost. This is a matter that is not usually estimated for when the change in lighting is proposed. There is St. Paul's Cathedral, In times past, air-warming by the aid of coke furnaces was the system of heating the historic building; and when supplemented by the heat given off by gas-jets, the plan was quite sufficient. Then electricity was brought into use for lighting purposes; and the need of a modern system of heating has become a matter of urgency owing to the growing complaints of discomfort in the winter. The result is that, in addition to the cost of installing the electric light, the authorities have had to go to the expense of putting in a low-pressure steam system. This is somewhat of an experiment for the heating of such a capacious building; and the extent to which the system will require to be applied is a matter of present experiment.

The information is to hand that the tragic fire at Messrs. Arding and Hobbs at Clapham Junction, which was caused just before Christmas by the bursting of an incandescent electric lamp, has involved the Insurance Offices in a loss of £130,000, of which amount the Phœnix Company will have to find the largest item—£33,000. Following upon this fire, the Phœnix Company publish a new edition of their rules; and it is seen that they are promptly putting into practical use for their own protection some of the disastrous experiences of recent times. We now read that "Flexible cords, except when used in connection with pendant lamps hung well clear of material, must not be used in shop windows containing inflammable goods." A similar condition is found in the rule dealing with special risks. "Drapers' shops, warehouses, stores, &c.," now have "Shop windows" as an additional sub-title; and to shop windows the restriction as to flexibles applies. The risk from the heat of electric lamps has not been overlooked; and it is stipulated that all lamps must be so fixed that there shall be no possibility of inflammable material being set on fire through lamp breakage. From "Temporary installations" flexible cord is debarred. It was thought that the old rules were sufficient to ensure safety. But the Insurance offices have been hard hit since then; and they are merely business people, and not philanthropists. By the way, when are we to have the publication of the promised proofs that the Kilburn fire was not caused electrically?

There was a large attendance at Fisherton Church on the morning of the 22nd ult., to witness the marriage of Mr. H. R. Hurle Bath, of Bloomsbury, and Miss Caroline E. Humphrys the fourth daughter of Mr. Norton H. Humphrys, of Salisbury.

THE GASLIGHT AND COKE COMPANY.

Half-Yearly Report.

THE following is the report on the working of this Company during the six months ending Dec. 31, which, with the accounts (an abstract of which appears on p. 309), will be submitted to the proprietors on Friday.

The accounts for the past half year show that, after providing for fixed charges, setting aside £10,000 towards the redemption fund (in accordance with the provisions of the Company's Act of 1903), and contributing £10,000 to the insurance fund, there remains a balance of £400,402 14s. 8d. The amount brought forward from the previous half year being £409,893 4s. 4d., there is a total sum available for distribution of £810,295 19s., out of which the Directors recommend a dividend on the ordinary stock at the rate of £4 13s. 4d. per cent. per annum, which will absorb £353,302 14s. 4d., and leave the sum of £456,993 4s. 8d. to be carried forward to the credit of the current half year.

The sales of gas for the half year show an increase of 4¾ per cent. compared with the quantity sold during the corresponding period of 1908. There has been an increase during the six months of 18,497 consumers, and of 35,153 in the number of gas-stoves sold and let on hire.

The Royal Assent was given to the Company's Bill in Parliament on the 16th of August last; and the amalgamation of the West Ham Gas Company with this Company took effect on the 1st of January.

The Directors had the pleasure of announcing a reduction, at the beginning of the year, of 1d. per 1000 cubic feet in the price of gas. This is the fourth reduction within 5½ years, and brings the price down to 2s. 8d. per 1000 cubic feet.

Notwithstanding the coal troubles in the North, the Company have received satisfactory deliveries of coal throughout the past few months; and the present stock at the works is ample for the Company's requirements.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distributing Departments respectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

CORBET WOODALL, Governor.

Horseferry Road, S.W., Jan. 20, 1910.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of the Company for the six months ended the 31st of December, which, with the accounts [see p. 310], will be presented to the proprietors at the ordinary half-yearly meeting on the 9th inst.

1.—At the price of 2s. 2d. per 1000 cubic feet charged for gas during the past half year, the shareholders are entitled by the sliding-scale to a dividend at the rate of £5 9s. 4d. per cent. per annum. The profits made during the six months enable this dividend to be paid, and at the same time to increase by £12,901 the balance carried forward to the current account.

2.—The anticipation that a reduction in the price of gas would stimulate the consumption has been realized; the increase over the corresponding period being 4·12 per cent. A slight improvement of trade in some parts of South London, as well as the activity of the Company's outdoor staff, has contributed to this satisfactory result.

3.—The disturbing effect in Northumberland and Durham of the Coal Mines Regulation (Eight Hours) Act is still a cause of anxiety. The Directors considered it a necessary insurance against interruption of supplies to lay down an increased stock of coal, in spite of the considerable cost entailed and the deterioration in quality which is certain to take place. It is hoped that matters will have settled down before the time comes for making fresh contracts, and that prices may then be more favourable to users.

4.—As regards working results, improvement in carbonizing can again be reported; the volume of gas made per ton of coal having risen to the satisfactory figure of 11,762 cubic feet. The effect of this has been that, notwithstanding the increased quantity of gas sent out, the coal used is less by 17,570 tons. There is again a considerable falling off in the return from residuals, chiefly under the heading of coke. The markets taking the surplus production have not been favourable, and endeavour is being made to counteract this effect in the future by encouraging a more extended use of this fuel within the Metropolis. Tar is lower to the extent of £1457, but now shows signs of improvement, mainly by reason of the better prices secured for pitch. The return from ammonia is practically unchanged, which is noteworthy if the smaller quantity of coal used is taken into account.

5.—Works costs have been heavier in the repairs necessary to plant; but there has been a good set-off in the saving of £7449 in carbonizing wages. Expenditure in the distribution department is still on the upward grade. A better and more extended service is required by the consumer, and recompense must be looked for in thereby extending and increasing the Company's business. A branch office and show-room have been opened at Streatham, and are already very popular. Both in number and in money, the losses from slot-meters show a satisfactory diminution, especially having regard to the increased number in use.

6.—Many of the principal thoroughfares are now lighted with inverted incandescent burners, giving a greater illuminating power at a reduced cost; and their use is extending.

7.—The Directors record, with great regret, the death of their late colleague Mr. Edward H. Cardwell. He joined the Board seventeen years ago, and in that period won the esteem and regard of all with whom he became associated. It will be necessary at the extraordinary meeting to fill the vacancy caused by his decease; and Mr. Kenneth Phipson Hawksley, a duly qualified proprietor, has given notice of his candidature. One ordinary Director (Mr. Charles Carpenter) and one Auditor (Mr. Thomas Spooner Soden) retire by rotation. They are both eligible, and offer themselves for re-election. Mr. James D. C. Hunter has been re-elected an Employee-Director.

8.—It only remains to add that the Company's co-partnership continues to justify the expectations formed regarding it.

CHARLES CARPENTER, Chairman.

709, *Old Kent Road, S.E., Jan. 24, 1910.*

GAS BILLS FOR 1910.

[FIFTH ARTICLE.]

CONCLUDING the notices of the Bills treating of gas supply that are to be promoted in the ensuing session, a few more introduced by local authorities have to be dealt with.

The Little Hulton District Council Bill is the one containing the coke-oven gas project, to which special reference was made in our editorial columns last week. The ratepayers have, in public meeting, voted against the scheme going forward; but the question of taking a poll is still in suspension, so that the Bill cannot yet be regarded as having been finally disposed of. Apart from this, there is sufficient technical interest surrounding the proposal to justify an outline of its main features. The Council ask to be empowered to purchase from the Salford Corporation the portion of the gas canalization of the latter in the district for the sum of £7500, and of the Farnworth and Kearsley Gas Company at a price to be determined by agreement or arbitration in accordance with the provisions of the Lands Clauses Act. The Council require to be invested with all the rights of gas manufacturers and suppliers. Authority is sought for the Earl of Ellesmere and the Council to erect and maintain gas-works; but the Earl is not to furnish gas within the limits of supply except to the Council. Then follows a clause confirming an agreement with the Earl, which agreement is the subject of a schedule to the Bill. Turning to the schedule (which is a long document), it is seen that on or before March 31, 1911, the Earl is to supply to the Council coke-oven gas, upon specified terms and conditions, for lighting, heating, and other purposes. At the outset the supply of gas is to be limited to the portion of the Council's district now supplied by the Salford Corporation; but if the Council thereafter are in a position to supply any other part of the district, then the Earl is to furnish the gas required. The Council are not to procure from any other source a supply of gas during the continuance of the agreement. The Earl is to erect, at his own expense, all the necessary plant, exclusive of coke-ovens, upon scheduled land, and, in addition, two "benches" of retorts, which—in the event of a strike of the workmen employed by the Earl in connection with the coke-oven plant and machinery, or other unavoidable stoppage preventing the supply of coke-oven gas—are to be operated and worked by, and at the expense of, the Council. Inserted are several protective clauses. Regarding the quality of the gas, it is to have an illuminating power of not less than 14 candles tested by the "Metropolitan" No. 2 burner, is to be free from sulphuretted hydrogen, is to have a calorific value of 550 B.Th.U. gross, and is to be supplied at such initial pressure up to 10 inches as may be desired by the Council. Gas supplied after purification, but exclusive of any enrichment, is to be paid for at the price of 9d. per 1000 cubic feet for any quantity up to 400,000 cubic feet per day; but if, in any year ending on Dec. 25, the quantity of gas supplied, upon an average, exceeds 400,000 cubic feet per day, then the price is to be reduced from 9d. to 7d. per 1000 cubic feet. In the event of the Earl supplying at a less price to other persons, then, during the continuance of such supply, the lower price is to be applicable to the Council. The latter guarantee that if, in any year, the quantity of gas taken by them does not amount to 8 million cubic feet, then the Council are to pay the Earl for the deficiency between the quantity taken and the quantity guaranteed. If, too, the gas, after purification, requires to be enriched to reach the 14-candle standard, or, if the Council desire the gas to be of still higher illuminating power, then the Earl is to enrich the gas at the price of ½d. per candle power per 1000 cubic feet. The Council's obligations in respect of distribution plant will extend from the station meter on the scheduled land. The agreement has long duration. It is proposed that it shall have a definite span of 35 years, and then only to be determined on five years' notice in writing. If the agreement is determined under the clause just referred to, then

the Council have conditional rights of purchase of the land and plant on which the works stand. The clauses in the Bill are of ordinary form. The maximum price of gas is placed at 3s. 6d. per 1000 feet for 14-candle gas, tested by the "Metropolitan" No. 2 burner. The Council ask for sanction to the borrowing of the money required for the purchase of the distribution plant of the Salford Corporation within the Council's area and of the Farnworth and Kearsley Gas Company (with 40 years for repayment), £2000 for the laying of a new main and altering existing mains (with 40 years for repayment), £1000 for working capital (with 10 years for repayment), and such sums as the Local Government Board may sanction for the extension and improvement of the gas-works (repayment period at the discretion of the Board, but not exceeding sixty years), together with the amount necessary for paying the expenses of the Act (with five years for repayment). [*Parliamentary Agents: Messrs. Lees and Co.*]

The Mallow (Cork) District Council come forward with a compulsory Purchase Bill—the object of their desires being the property of the New Mallow Gas Company, Limited, who have also a Bill in Parliament. It is proposed that the purchase shall be either by agreement or arbitration; and this and the whole of the succeeding clauses referring to the transfer are in the ordinary form. The manufacturing and supply clauses are also of the customary character. An unusual proposition is that the price charged for gas "shall not at any time exceed such price as may be determined by the Board of Trade within one month after the price or consideration for the purchase of the undertaking of the Company has been determined." The prescribed illuminating power of the gas is 14 candles, tested by the "Metropolitan" No. 2 burner. Borrowing power is requested for the sum needful for the purchase of the concern, to be repaid within forty years; and for the extension and improvement of the undertaking and for working capital, such sums as the Local Government Board may sanction. [*Parliamentary Agents: Messrs. Lees and Co.*]

The question of the removal of the gas-works of the Matlock Bath and Scarthin Nick District Council is again to come before Parliament. The matter has been one that has engaged attention since 1896, in which year an Act was passed providing that the Council should, within seven years from Jan. 1, 1897, which was the date of transfer to them of the gas undertaking, remove the gas-works from the lands then occupied to some other site within the urban district of Matlock. In 1905, the time was extended to a further period of seven years. By the same Act power was given to the borrowing of £10,000 for the purposes of the removal and re-erection of the gas-works; but the works have not been removed, nor has the money been borrowed. Now the Council are asking that the provision as to the removal of the works should be repealed, and that they be empowered to maintain the existing works on their present site. This is the subject of the principal clause in the Bill; and then there follow a number of clauses giving ordinary powers—among them the old 10 and 15 per cent. discounts clause and the prepayment meter clause. Borrowing powers in respect of the gas-works are sought to the extent of £3000, for which (the proposed works being permanent ones) 40 years are named as the period of repayment. [*Parliamentary Agents: Messrs. Roberts and Co.*]

One part of the Middlesbrough Corporation Bill deals with gas and electricity. In connection with both commodities, the promoters contemplate power to supply prepayment meters, cookers, and fittings, demanding and taking therefor "such remuneration, or rents and charges, and making such terms and conditions, as may be agreed upon." An amendment of section 10 of the Corporation (Gas) Act of 1898 is proposed which will have the effect of substituting "not less than 12 candles" for the words "not less than 15 candles." It is also proposed to secure authority to allow discounts to large consumers of gas supplied for power purposes, not exceeding in any case 15 per cent., with the proviso attached that "such discounts shall be alike in terms and amount under like circumstances to all such consumers." The Corporation have by reason of the large increase in the demand for the supply of gas within the borough, expended money in providing gas mains and meters in excess of the sums which they were authorized to borrow for these purposes; and they now ask that all such expenditure (not exceeding £10,000) in excess of the amount authorized, be ratified. Provision is included for the repayment to the account or fund from which such expenditure was made of the whole of the money out of the loan to which sanction is now desired. Authorization is asked to the borrowing of not exceeding £10,000 for the purpose, to be repaid within thirty years, as well as to the borrowing of £50,000 for additional gas mains, meters, and fittings, with repayment in the same period. The following provisions relate to the vending of coke in the Corporation area:

All coke shall be sold by weight only, except where, by the written consent of the purchaser, it is sold by boat-load or by waggons or tubs delivered from the works where the same was made into the works of the purchaser.

If any person sells coke otherwise than is required by this section, he shall be liable to a penalty not exceeding £5 for every such sale.

Where any quantity of coke exceeding 2 cwt. is delivered by means of any vehicle to a purchaser, the seller of the coke shall therewith deliver, or cause to be delivered, or to be sent by post or otherwise to the purchaser or to his servant, before any part of the coke is unloaded, a ticket or note giving a statement of the correct weight of the vehicle, as well as the correct net weight of coke contained in the vehicle.

If default is made in complying with the requirements of this section with respect to the delivery or forwarding of a ticket or note, or if the quantity of coke delivered is less than the quantity expressed in the ticket or note, the seller of the coke shall be liable to a penalty not exceeding £5.

If any person attending on any such vehicle having received any such ticket or note for delivery to the purchaser refuses or neglects to deliver it as required by this section, or, on being requested so to do, to exhibit it to any inspector of weights and measures or other officer appointed by the Corporation, he shall be liable to a penalty not exceeding £5.

If any person in charge of any vehicle in which coke is being carried, wilfully makes any false statement as to the tare weight of the vehicle, or wilfully does any act by which either the seller or purchaser of the coke is defrauded, he shall be liable to a penalty not exceeding £5.

Every person who shall sell or offer for sale coke in quantities not exceeding 2 cwt. in sacks only, shall carry such coke in sacks containing either 1 cwt. ½ cwt. or ¼ cwt., and shall affix or cause to be affixed to the top of every such sack a metal label indicating the correct weight of coke therein. Any such person failing to comply with the requirements of this section shall be liable to a penalty not exceeding £5.

Any seller or purchaser of coke or person in charge of a vehicle in which coke is carried, or any inspector of weights and measures or other officer appointed by the Corporation may require that any coke, or any vehicle used for the carriage of coke, be weighed or re-weighed by any instrument stamped by an inspector of weights and measures. Provided as follows:

(*a*) No seller of coke, or person in charge of a vehicle in which coke is carried, shall be required under this section to carry coke beyond such distance not exceeding ½ mile as may be prescribed in that behalf by the Corporation;

(*b*) Where any such coke or vehicle has, at the instance of the purchaser, been weighed or re-weighed in pursuance of this section, and found to be of the weight stated in that behalf by the seller of the coke or the person in charge of the vehicle, the purchaser shall be liable to the payment of all reasonable costs actually incurred of, and incidental to, the weighing or re-weighing.

If any person obstructs any weighing or re-weighing authorized by this section, he shall be liable to a penalty not exceeding £5.

Any inspector of weights and measures or officer appointed for the purpose by the Corporation may stop any vehicle carrying coke for sale or delivery to a purchaser, and may weigh any load, sack, or other less quantity of coke found on such vehicle or which is in course of delivery to any purchaser.

If it appears to a court of summary jurisdiction that any load, sack, or less quantity so weighed is of less weight than that represented by the seller, the seller or person in charge of the vehicle shall be liable to a penalty not exceeding £5.

Any person who obstructs or hinders any inspector acting under this section shall be liable to a penalty not exceeding £5.

The Corporation also take power to create an accident fund to meet claims under the Employers' Liability or Workmen's Compensation Acts. The fund is to be formed by appropriations out of the various revenues, and it may accumulate until it stands at a maximum of £12,000. [*Parliamentary Agents: Messrs. Durnford and Co.*]

A Bill dealing with a variety of matters is being promoted by the Middleton Corporation; and one of its sections has reference to gas supply. But the provisions are merely to put the Corporation in possession of modern, and now usual, powers, including the prescription of the standard illuminating power of the gas at 14 candles, and its testing by the "Metropolitan" No. 2 burner. [*Parliamentary Agents: Messrs. Baker and Co.*]

In the Rhondda District Council Act, there is a clause, in the miscellaneous section, providing that a person shall not be entitled to demand from the Council a supply of gas, or the continuance of a supply, for premises having a supply of either gas or electricity from an installation other than that of the Council, unless he shall have previously agreed to pay the Council such minimum annual sum as will give a reasonable return on the capital expenditure and standing charges incurred by the Council to meet the possible maximum demand for the premises. [*Parliamentary Agents: Messrs. Torr and Co.*]

In the Warrington Corporation Bill, the Corporation seek, *inter alia*, to bring their gas powers up to date. From the preamble, it is seen that they have incurred capital expenditure in excess of their authorized borrowing powers for, among other things, the purchase of land for gas-works purposes at Winwick Road. In this instance, the expenditure has been advanced out of the gas-works reserve fund, and now amounts to £2083 16s. 6d. Certain amendments are to be made in former enactments relating to the charges for gas. A clause is inserted which proposes that "the Postmaster-General, in laying down any mains, pipes, wires, or other apparatus for telegraphic or telephonic purposes within the limits of the Corporation for gas supply shall not, without the consent in writing of the Corporation lay the same above, or so as to interfere with the access of the Corporation to any of the gas mains, pipes, or apparatus of the Corporation." Among a number of general powers, are found clauses providing for the payment of a standing charge, in addition to the price of the gas actually supplied, where a gas installation exists other than that of the Corporation. There is also a provision regarding a minimum charge for gas laid on to premises having a supply of electricity. These clauses are, *verbatim et literatim*, the same as those appearing in the Heywood Act of last session [see "JOURNAL" Oct. 12, p. 104]. In the financial section of the Bill, the Corporation ask for power to borrow, among other amounts, the sum previously referred to as having been expended in the purchase of land for gas-works purposes, with a period of repayment extending over sixty years. [*Parliamentary Agents: Messrs. Baker and Co.*]

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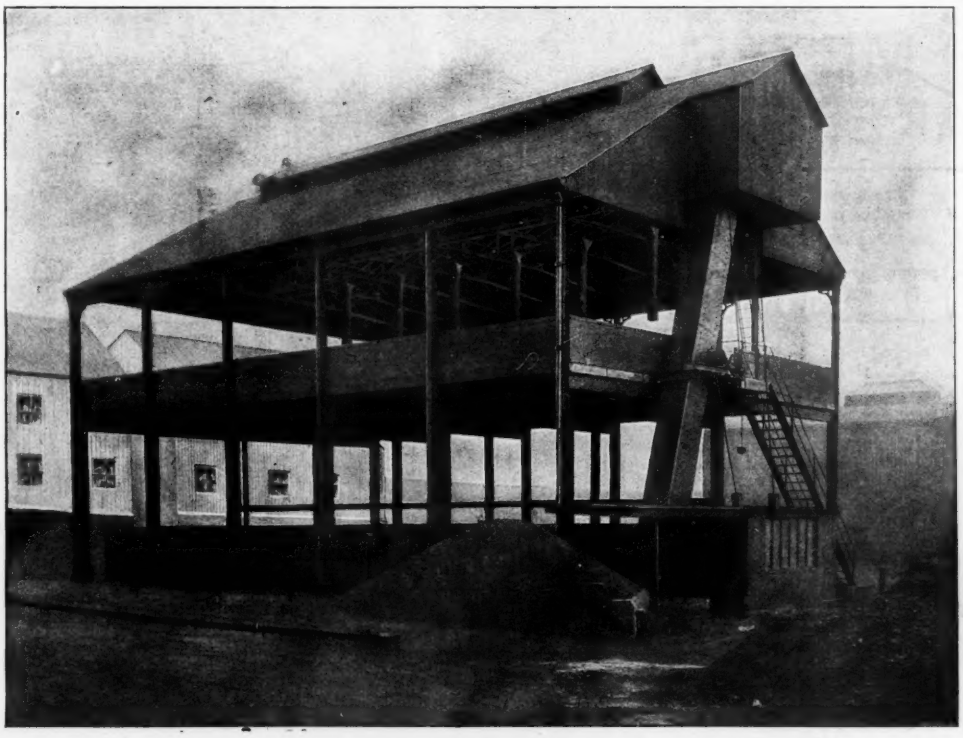

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LATEST DESIGN.

MUTUAL COMPENSATION SCHEMES.

THE particulars which have been given in the last two issues with regard to the operation of the Workmen's Compensation Acts during the year 1908, may now be supplemented by a few figures, covering the same period, in connection with the various mutual schemes entered into by employers and employed for the purpose of "contracting out" of the Act. This information is to be gathered from the Annual Report of the Chief Registrar of Friendly Societies, by whom all such schemes have to be certified. This document for 1908 bears the familiar signature of Mr. J. D. Stuart Sim.

On the passing of the Workmen's Compensation Act of 1906, it was pointed out that the measure altered to a considerable extent the provisions hitherto existing for enabling employers and workmen to "contract out." The scales of compensation in connection with such schemes are to be not less favourable to the workers and their dependants than those contained in the Act. If the workmen contribute, the scheme must confer benefits at least equivalent to those contributions in addition to the benefits to which the employees would have been entitled under the Act; and a majority of the workmen (to be ascertained by ballot) must be in favour of the scheme. The Registrar, however, is not deprived of the discretion given him by the Act of 1897 in comparing the benefits under a scheme with those under the Act. The scales can be considered as a whole; they need not be absolutely identical with those set forth in the Act. He can also take into consideration any extra benefits conferred under a scheme, and not mentioned in the Act. As regards the scale of compensation, the principal alteration brought about by the 1906 Act is, of course, that in case of incapacity the payment dates from the time of the accident—unless the incapacity lasts for less than two weeks, when no compensation is payable for the first week—instead of from a fortnight after it.

The returns for the year ending Dec. 31, 1908, show that during this period there were 32 schemes in active operation under the Act of 1906. They are divided under the headings of railways, factories, mines, and quarries. The Great Eastern—the only Railway Company represented—possess a scheme which was adopted by 28,628 of their workmen, out of 30,000. The men contributed in the aggregate £6034 during the year; and the Company, £12,241. The payments on death were £6286, and during incapacity £9799; the balance of funds at the end of the year amounting to £1801. The number of deaths resulting from injury was 38; while there were 2911 cases of incapacity. The average contribution of each employee worked out at 1d. per week. The twelve schemes in connection with mines were adopted by 16,702 workmen, out of a total of 17,227; their contribution being £6942, and that of the employers £10,189. The total payments were: On death, £1594; during incapacity, £9189; for other benefits, £2593. At the end of the year, the funds were £49,154. There were twelve deaths, and 3290 cases of incapacity. The average contribution of each workman was 8s. 3d. One scheme relating to quarries was adopted by the whole of the 770 employees, who contributed £229. The contribution of the employers was £565. The payments to dependants on death were £39; while £364 was paid during incapacity (223 cases), and £297 for other benefits. The average contribution of workmen was 6s.; and the funds at the end of the year amounted to £1005. In England and Wales, there were sixteen schemes in relation to factories of various kinds. These were adopted by 16,205 workmen out of a total of 16,539. They contributed in the aggregate £1172; the amount given by the employers being £7959. The payments on death were £1202; during incapacity, £5499; for other benefits, £2196. The funds at the end of the year totalled £8337. The number of deaths resulting from injury was five; and in all except one case dependants were left, to some of whom pensions were granted, in addition to the money returned as having been paid. There were 1185 cases of incapacity. The average contribution of each workman for the year was nearly 1s. 6d.; but in four of the schemes the whole of the contributions were paid by the employers. There were also two factory schemes in Scotland, which were adopted by the whole of the 2972 workmen employed, who contributed £466, to which the employers added £1776. The payments on death were £478; during incapacity, £1071; for other benefits, £63. The funds amounted to £4988. One death from accident occurred during the year; while the number of cases of incapacity was 310. The average contribution of each workman was 3s. 2d.

These factories cover a wide range of industries; but it is to be noted that the number of gas undertakings in connection with which mutual compensation schemes are in operation still remains at two—the South Metropolitan Gas Company and the South Suburban Gas Company. Once more, in the case of the South Metropolitan Company the whole of the 6192 workmen employed "contracted out" of the Compensation Act by joining the mutual scheme; their contributions for the year to Dec. 31, 1908, amounting to £165, and those of the Company to £1627. The payments on death and to dependants came to £702; but there was actually in the twelve months included in the return only one death. The cases of incapacity numbered 192, in connection with which £854 was paid. Other benefits absorbed £236; and these payments equalled the contributions (£1792) made by the Company and the employees. In the case of the South Suburban Company, also, the whole of the 635 men employed joined the scheme; the workmen contributing £29, and the Company £197. No fatal accident occurred during the year; but a sum of £30 is returned under the heading of "On death and to dependants." There were 37 cases of incapacity, in connection with which payments amounting to £164 were made. Other benefits absorbed £32; and these sums equalled the contributions (£226) of the Company and the employees. It is estimated that the maximum amount payable under the Act in connection with the cases of incapacity would have been £124, as compared with the £164 actually distributed by the South Suburban Company under their scheme.

It seems that, in the aggregate, particulars were returned of 7740 cases of incapacity completed during the year by weekly payments; a sum of £19,679 being involved. In nearly 19 per cent. of the total number, the duration of incapacity was one week and under; the cost being £893, or an average of 12s. 2d. for each case. In 20 per cent. of the whole, the duration was over one week, and under two weeks; the cost being £1715, or £1 1s. 11d. per case. There were 43 cases (0·56 per cent. of the total number) in which the incapacity exceeded 26 weeks; and the cost of these to the funds was £29 10s. 11d. for each case, or 13s. 4d. per week of incapacity. It would appear from eight returns furnishing information as to the estimated maximum amount that would have been payable under the Act, that the workmen would have been entitled to receive £2815; whereas the sum actually paid to them under the respective schemes was £3080. In addition to those already mentioned, 42 cases of incapacity were settled by the payment of a lump sum, thus making the total number of cases completed during the year 7782, the cost of which was £22,945. In the aggregate, the 32 schemes were adopted by 65,277 workmen, whose contributions during the year amounted to £14,843—those of the employers being £32,730. There were 56 fatal accidents; and a total of 7919 cases of incapacity.

LOCAL INCOME AND EXPENDITURE.

Finances of Urban District Councils.

HAVING given some attention to the finances during the twelve months ending March 31, 1907, of the Borough Councils (*ante*, p. 229), we are now confronted with the succeeding instalment of the Local Taxation Returns (Part VI.) for that year. This deals with the accounts of Urban District Councils, other than Town Councils; the period covered being precisely the same—from March 31, 1906, to March 31, 1907.

The number of urban district councils in England and Wales, for districts other than boroughs, dealt with in the report is 811. This shows a decrease of one when compared with the previous year; there having been two new councils formed, while three have disappeared owing to incorporation, &c. Though not generally on so large a scale, the financial transactions of the district councils are in many ways similar to those of the borough councils. A considerable portion of the transactions recorded relates to water, gas, electric lighting, market, and tramway and light railways undertakings, which are all of a "reproductive" character. It is pointed out in the returns that the total receipts from these concerns were sufficient to cover 94·3 per cent. of the expenditure on them, including charges in respect of loans. A further large part of the transactions relates to the works of private improvement, the cost of which is recovered by the councils from owners or occupiers of property; and then, in addition, the receipts include sums from such undertakings as sewage farms, baths and wash-houses, slaughter-houses, hospitals, cemeteries, &c. Of the total number, 54 councils acted as local elementary education authorities.

The receipts of the urban district councils, excluding receipts from loans, amounted during the year 1906·7 to £10,724,289, including £1,524,000 on account of elementary education. The total receipts of the councils for the preceding year were £10,447,232. These receipts included sums received from county councils under the provisions of the Local Government Act, 1888, and also grants under the Agricultural Rates Act, 1896. The latter Act, however, does not apply to general district rates, which, in the case of the urban district councils, produced 85·8 per cent. (£5,013,139) of the total raised by rates (£5,840,533); and hence the amount of the grants is small in comparison with that of the total income from rates. Among the other receipts were: Gas-works, £887,996 (as against £871,891 in the preceding year); water-works, £663,151 (against £650,567); electric light undertakings, £282,893 (against £241,371); and tramways and light railways, £208,716 (against £153,110). It is pointed out in the Blue-Book that in making comparisons of the totals of urban district council financial items, the fact should always be borne in mind that the authorities included are subject to variation from year to year—fresh bodies being continually added, and others removed from, the list. So far as it has been possible to ascertain from the returns made, the receipts in respect of gas-works, just quoted, for the year 1906·7, included £662,815 from gas-rentals, and £193,234 from the sale of residual products. The receipts in respect of water-works included £461,077 from water rates, rents, or charges for domestic purposes within the respective districts of the councils owning the water-works. The amount raised during the twelve months

under review by means of public rates accounts for 54·5 per cent. of the total receipts; while the returns from the principal undertakings which produce revenue (water, gas, electric lighting, markets, and tramways and light railways), together with the sums recovered in respect of private improvement works, represent rather more than 23·8 per cent. of the councils' income.

In the twelve months ending March 31, 1907, the total expenditure of the councils, excluding that defrayed out of loans, was £10,640,892, as compared with £10,503,244 the preceding year; so that there was an increase in the outlay of £135,000. About £20,000 more appears under the head of elementary education; and loan charges are £63,000 heavier. The following items of expenditure (in which charges for interest and repayment of loans are not included) may be mentioned: Public roads and streets, £1,658,858 (as against £1,673,199 in the previous year); education, £1,355,426 (against £1,342,848); gas-works, £604,695 (against £574,823); public lighting, including public lighting by electricity, £489,481 (against £469,153); sewerage and sewage disposal, £455,061 (against £446,913); water-works, £381,368 (against £371,628); tramways and light railways, £134,834 (against £103,540); electric lighting, not being public lighting, £129,687 (against £118,698); and £2,887,588 for repayment of principal (otherwise than out of sinking funds or redemption funds), payments to sinking, &c., funds, and interest on loans, as compared with £2,824,639 in the preceding year. Of the principal and interest so repaid, and allocations to sinking funds, £250,009 was on account of gas-works, £382,935 of water-works, £161,445 of electric lighting, and £116,076 of tramways and light railways. The aggregate length of roads maintained and repaired by the councils at the commencement of the year 1906-7 was 2363 miles; and the outlay under this head amounted during the twelve months to £461,283, or at the rate of £195 per mile. The total length of roads other than main roads maintained and repaired was 11,357 miles; the expenditure being £863,086, or an average cost of £76 per mile.

The expenditure of the district councils out of loans (including certain sums spent in anticipation of loans) during the year 1906-7 amounted to £2,835,487. Of this, £108,833 was on gas-works, £257,378 on water-works, £215,957 on electric lighting, £440,714 on tramways and light railways, and £510,919 on sewerage and sewage disposal works. The total expenditure out of loans during the year was less than that of the preceding twelve months by £260,614. Large decreases appear in the expenditure on account of electric lighting, water-works, sewerage and sewage disposal works, and private improvements; but the outlay on elementary education and on tramways and light railways shows an increase. The total amount of the loans raised during the year was £2,793,697, including the following amounts: Gas-works, £103,233; water-works, £332,760; electric lighting, £161,672; tramways and light railways, £469,089; and sewerage and sewage disposal works, £540,249. The amount of loans raised was less by £474,617 than that raised in the previous year; the decrease being spread over most of the undertakings—one exception being tramways and light railways.

The amount actually repaid during the year in respect of loans (including payments out of sinking and redemption funds, but excluding unexpended balances of loans applied to the repayment of principal) was £1,696,337. The outstanding loans at March 31, 1907, amounted to £35,622,307. Of this debt, £8,582,717, or 24·1 per cent., was for purposes of sewerage and sewage disposal; £5,516,276, or 15·5 per cent., for water-works; £3,705,928, or 10·4 per cent., for education; £3,466,513, or 9·7 per cent., for gas-works; £2,927,234, or 8·2 per cent., for street improvements; £2,334,510, or 6·6 per cent., for electric lighting; and £2,043,783, or 5·7 per cent., for tramways and light railways. The loans outstanding in respect of what are termed the "reproductive" undertakings, and for works of private improvement, represent a large proportion of the debt; the aggregate for gas-works, water-works, electric lighting, tramways and light railways, markets, and works of private improvement being no less than £14,422,674, or 40·5 per cent. of the total debt. The loans outstanding during the year dealt with in the Blue-Book increased by £1,150,000; the largest increases being for tramways and light railways, elementary education, water-works, sewerage and sewage disposal, street improvements, and electric lighting. The amount remaining at the end of the twelve months in sinking and redemption funds for meeting loans repayable in this way was £566,056. The sum paid into the funds during the year was £221,491; and the amount taken out of them and applied to the repayment of principal was £213,943.

According to the 1901 Census, and taking into account the alterations of area since that time, the total population of the 811 urban districts other than boroughs was 6,808,318. The total assessable value of these districts for the purposes of the general district rates, or other rates out of which the general expenses of the district councils were defrayed, was £31,804,974. The rates raised by the councils, other than for purposes of elementary education, amounted to £5,157,702, and were equivalent to 3s. 2·92d. in the pound on the total assessable value of the districts for the purposes of such rates. This figure compares with 3s. 2·63d. in 1905-6. The total sum raised by the councils by means of rates during the year for the purposes of elementary education, amounted to £682,831, or (say) 1s. 3·33d. in the pound calculated on the assessable value for the purposes of the poor rate of the districts in which the amount was raised.

Comparative tables which accompany the returns show that the receipts of urban district councils from all sources, other than from loans, increased from £8,399,739 in 1902-3, to £10,724,289 in 1906-7. In this period it should be pointed out, the receipts under the head of elementary education have gone up from £174 to £838,178. The total expenditure not defrayed out of loans increased in the five years from £8,358,596 to £10,640,892; the rise in the figures for elementary education being from £12,508 to £1,265,178. The receipts from rates, for purposes other than elementary education (including grants under the Agricultural Rates Act), which amounted to £4,940,679 in 1902-3, rose in 1906-7 to £5,161,654. Receipts from the most important undertakings which yield revenue—gas-works, water-works, electric lighting, tramways and light railways, and markets—show, it is pointed out in the Blue-Book, large increases during the last four years; while the annual expenditure in connection with them has also gone up considerably. In recent years, it is added, there has been a distinct slackening in the rate of increase of the debt of urban district councils. During the five years ended March 31, 1907, however, there was a rapid and continuous increase in the amount of outstanding loans for electric lighting and tramways and light railways. The item of elementary education also, of course, greatly increased in the years during which such loans formed part of the debt of the urban district councils. In the period between March 31, 1903, and March 31, 1907, the outstanding loans for electric lighting increased from £1,497,066 to £2,334,510; while those for gas-works showed little change—having merely gone up from £3,278,203 to £3,466,513.

COMMERCIAL PEAT: ITS USES & POSSIBILITIES*

THE book under review is intended as a companion to "Peat: Its Use and Manufacture," which was written by the same author, assisted by the late Mr. P. R. Björling. An extensive amount of information on this fascinating, though as yet unprofitable, subject has been collected in this volume. So much, indeed, that it would at last appear as though the pioneering work must be drawing to a close—giving place to a more profitable future.

So much ingenuity has been put into several of the best known processes for the utilization of peat, that success is well merited. The vastness of the possibilities of the peat industry are better understood when we realize that, compared with Ireland's 2,800,000 acres of peat bogs, Canada and the United States are known to possess 50,000,000 acres; and many other countries are vastly endowed (or otherwise) with peat land. The author gives chapter and verse for his belief in the great commercial possibilities in the production of alcohol from peat. Its suitability as a substitute for petrol and the cheapness of its production (said to be 3d. per gallon) seem to bear evidence to the feasibility of his argument.

The Woltereck process for the production of ammonia, in which the peat is subjected to moist combustion in special furnaces, maintained at a low temperature, is described in Chapter II. The process, which has been found to give a yield of 5 per cent. of sulphate of ammonia, has been successfully employed on peat containing upwards of 80 per cent. of water without any preliminary drying. It is well known that the greatest difficulty encountered in the utilization of peat is the very real one of drying a material containing some 90 per cent. of water; and it is very evident that only those methods which deal with this difficulty in a cheap and practical manner have any chance of achieving a financial success. A chapter is devoted to the value of peat for the production of nitrogenous compounds. Peat will contain anything from 1 to 2 per cent. of nitrogen. As an instance of the value of this constituent, the author states that a bog of 2500 acres, of a depth of 6 feet, with a content of 2 per cent. of nitrogen, is capable of yielding between 800,000 and 900,000 tons of nitrate of sodium.

Space will not allow of a description of the Ekenberg wet carbonizing process, in which peat is dried in a most ingenious manner and finally briquetted to produce fuel very nearly equal to coal. Several gas-producers have been manufactured for the use of peat. Messrs. Crossley Bros., who have devoted much attention to this problem, state that excellent results may be obtained from peat containing as much as 60 per cent. of water, while the production of sulphate was found on a number of tests to be, on an average, considerably over 100 lbs. per ton. An interesting description is given of Ziegler's peat-coking process which has, on a limited scale, established itself as a commercial success in Germany, though at present a plant at Dartmoor, erected in 1908, is the only one working in this country. The manufacture of paper from peat is another of the industries which may gain a footing from a properly-organized development of this waste material.

The drying of peat, its excavation and cutting, mincing, and squeezing, are all described in some detail, while illustrations are given of the various types of machinery and furnaces in use. No possible purpose to which peat may be put seems to have been overlooked by the many ingenious inventors who have linked their fortunes to this hitherto disappointing substance. A peat moss litter factory, with its baling press, its grinding willow, and

* Commercial Peat: Its Uses and Possibilities. By Frederick T. Gissing. London: Charles Griffin and Co., Limited; 1909. [Price 6s. net.]

its rotating sieves, makes an interesting description. It is, indeed, a very evident fact throughout the book that the author has spared no pains to make his work complete.

No suggestion is made that dried peat should be used for ordinary gas-making purposes, though it is known that a ton of peat in a properly-dried state will yield 11,000 cubic feet of 17 or 18 candle gas. It could have been wished that more evidence had been shown in this work of the value of the various processes described from a dividend-paying point of view. Several of those in question were stated to be well established and profitable; but, unfortunately, no figures are given which would inform those interested as to what extent they are financially successful. Without these very necessary particulars, it cannot be said that the "possibilities" are put forward as fully as might be desired.

A practical demonstration in £ s. d. is necessary before business people will be convinced of the feasibility of peat being made a commercial success. The book is, however, full of information, is well illustrated, and is decidedly interesting and instructive. The author evidently has a thorough grasp of his subject, and succeeds in imparting some part of his enthusiasm to his readers.

AMERICAN GAS INSTITUTE AND CALORIMETRY.

As mentioned in the account of the proceedings at the last annual meeting of the American Gas Institute which appeared in the "JOURNAL" for the 9th of November, the Committee on Gas Calorimetry submitted a report on their work during the year. It was presented by Mr. J. B. Klumpp, the Chairman, who offered a few explanatory remarks, from which we take the following particulars.

The work of the Committee was carried on, as in the preceding year, at the Wisconsin University; and it comprised the investigation of various calorimeters and methods of operation. The Committee went generally over the previous year's work, and found that the instructions then given were practically correct. They emphasize the necessity for care in the selection of apparatus, particularly meters, the interior water overflow of which causes trouble and discrepancies. A case came under their notice where a large sum of money was held up on a contract because an error of from 15 to 20 per cent. was made in the calorific value of the gas, due to faulty meter registration, arising from the cause named. The principal difficulty in regard to the accuracy of calorimeters in the past has been the temperature of the inlet water. In their previous report, the Committee said this should be the temperature of the room. They investigated the subject very thoroughly last year. With the room temperatures at 70° Fahr., and with water temperatures as low as 40° and as high as 90° Fahr., they obtained a curve that showed the error for various temperatures. With the water at 40° and the room at 70°, the error was as high as 20 B.Th.U. *plus;* with the water at 90° and the room at 70°, it was 18 B.Th.U. *minus*. This curve showed that if the water temperature was within 5° of the temperature of the room, the reading should be within 1 B.Th.U. of the heating value of the gas, provided everything else was right. This subject was further analyzed by determining the radiation of the calorimeter and the loss in absorption of sensible and latent heat. The radiation equalled from 5 to 6 B.Th.U.; but the results came within 1 B.Th.U. of the correct heating value when the water was within 5° of the temperature of the room. These readings are all shown in detail in the report. The Committee made an investigation of the effect of humidity on the calorimeter, and found that in extreme cases there was an error of 4 to 6 B.Th.U. That is to say, when the humidity was from zero to 30 per cent., the error was as high as 4 to 6 B.Th.U.; but if it was within 50 to 100 per cent., or normal conditions, the error was within 2 B.Th.U.

In their previous report, the Committee recommended that thermometers should be placed on the same level. They received a letter from the makers of the Junkers calorimeter in Germany stating that they were constructing them in accordance with this design. They also now make a calorimeter that has provision for cleaning, which the Committee found was a very necessary qualification. They consider that after it has been used for about two years it should be cleaned the same as a boiler—the scale or mud being taken out of the water-jacket. If the bottom of the calorimeter can be taken off without unsoldering, it makes a much more convenient and reliable instrument. The Committee still believe they can get thermometers to read accurately with 0·1 of 1°—that they can calibrate their meters to read correctly, and can weigh the water or measure it accurately, and get a heating value that will be within about 1 per cent. of the actual heating value of the gas.

The following are some extracts from the last

REPORT OF THE COMMITTEE.

In 1907, the first Committee on Gas Calorimetry was appointed by the President of the Institute, and, after a year's investigation and experimental work, the report of the Committee was presented to the Institute in October, 1908.*

The Committee, after a complete search of available literature on the subject, found little authentic information published that would enable them to draw any real conclusions as to the best methods or the best instruments to adopt for commercial practice. It was therefore decided to obtain calorimeters of various types, and proceed with as thorough an investigation of the gas-calorimeter as was possible in the limited time at their command. The report of 1908 furnished a detailed description of the experiments undertaken and the methods adopted in arriving at the conclusions given. The experimental work with such instruments as were obtainable enabled instructions and precautions to be formulated which were considered necessary in assisting the average operator to a more accurate determination of the calorific value of the gas. The work undertaken at that time brought to light several important points that needed further investigation to confirm these deductions and conclusions; and to this end the Committee was continued, and further experimental work was undertaken during the past year. The result of these experiments, and the inferences deduced, seem to confirm the statements made by the Committee in 1908.

The report presented to the Institute last year covered a short description of the practice of gas calorimetry in both America and Europe, and gave reasons for the increasing use of the calorimeter as an instrument for determining the quality of a commercial gas. It went into the principles of gas calorimetry, and described the methods of general operation and the reason for selecting the units of measurement. An investigation of several types of calorimeters was then made, and the type embodying the principle of heating a certain quantity of water to a known temperature was generally approved and adopted as being the most practical method of determining the heating value of a commercial gas.

Four different makes of gas-calorimeters were tested: The Junkers, Boys, Simmance-Abady, and Sargent. Descriptions and illustrations of these instruments were given, showing the methods adopted by the inventors in utilizing the principle of water heating. The instruments were purchased direct from the manufacturers by operating concerns, whose purpose was to use them in daily work; and they were not specially prepared for scientific investigation. The Committee, appreciating the result of the publication of such an investigation, were exceedingly careful in the selection of a suitable location for their work, the adoption of most carefully calibrated meters and thermometers, which were checked by the best authorities, and in choosiug operators whose work could be thoroughly relied upon and be unbiased.

Tests were made to determine the best type of meter for measuring the volume of the gas, a suitable type of governor for governing the pressure of the gas, and the most practical method of determining the exact quantity of water passed through the calorimeter. A careful study of the calorimeter proper was made to determine the most convenient and most accurate method of transmitting the heat from the gas to the water, the best type of gas-burner to use, and what was necessary in the way of thermometers that would give accurate temperature readings. This question of thermometers occupied a large proportion of the time spent in the investigation; and it was only after many calibration tests that some few thermometers were found which, with proper correction curves, were accurate enough to be adopted.

The work of the Committee was then devoted to the very important subject of the water supply. This was found to be one of the fundamental qualifications for accurate work; and the quantity of water to be used, and the inlet temperature and rise in temperature of that water, were made the subject of very careful study. Further tests on the general efficiency of the calorimeter were carried out, and gave results that confirmed previous investigations in Germany by Dr. Immenkötter, and confirmed the views of the Committee that the gas-calorimeter could be made and operated as an instrument of precision. The operating instructions given in the report of 1908 were compiled after a thorough study of the subject. They were intended to be concise and explicit; and it was hoped they would enable the average works operator to use a calorimeter with consistent results.

Finally, in the report for 1908 suggestions were made for further investigation. These covered the work which the previous Committee were unable to carry through, owing to the limited time at their disposal; and it was desired that these determinations should be made, if possible, by continuing the investigation. The suggestions consisted of determining the effect on heating value resulting from a difference in temperature between the inlet water and the room temperature, the effect on calorific readings resulting from a varying atmospheric humidity, and a determination of the heat lost through the products of combustion leaving the calorimeters above or below the atmospheric temperature. The work was continued along these lines; and the results, with those of some further experimental work carried on, are submitted in the present report.

This year [1909], as last, your Committee confined themselves to the water-heating type of calorimeter, and continued their investigation with some of the instruments previously tested, with the addition of some others obtained for comparative purposes. The investigation followed somewhat the lines laid down and suggested in the previous year's report as being desirable to continue; and the results obtained signified the correctness of the deductions then made.

Appreciating that one of the greatest and most frequent causes for discrepancies in results was the variation in the temperature of the inlet water from that of the measured gas and the surrounding air, a series of experiments were undertaken to determine

* See "JOURNAL," Vol. CIV., p. 904.

what this discrepancy was, and then an analytical determination of the individual causes and confirmation of the results. The results of this test go to prove the conclusions and instructions given in 1908, that the temperature of the inlet water should be approximately the same as that of the gas and the atmosphere of the room. A series of experiments were made to determine the effect of varying the temperature of water at the outlet. This work was, of course, limited by the capacity of the calorimeter for water, and the rate at which the water could be made to pass through the instrument. The limits of this were comparatively close; and results confirmed last year's investigation.

From the observations made in these tests, it was apparent that there was some discrepancy in the readings, due to the difference in humidity between the gas and air supplied and the products of combustion. So preparations were made to vary artificially the humidity of the gas and air delivered to the calorimeter. The result of this test showed that the error caused by the humidity of the air is a relatively small quantity, seldom exceeding a figure that will cause excessive discrepancies in the final results. This observation is directly opposed to the results observed in determining the value of a gas by readings of illuminating value, which show greatly the effect caused by variations in humidity.

Several calorimeters were obtained by the Committee for the purpose of comparison. They consisted of one other Junkers, two instruments of a further improved Sargent type, and a Graefe calorimeter—the last a cheaper article now being placed upon the American market. The details of the last comparisons are included in the reports, as tending to conclude the work of the preceding year. An investigation was further made to determine what could be obtained in the way of a serviceable thermometer that would be accurate at all points in the scale, and show positively the difference in the inlet and outlet water temperatures. The results of this work are given by a description of these thermometers and a set of calibration curves obtained from a test of a pair received by the Committee. The conditions of gas supply and storage were exactly as before, and consisted of taking all samples direct from the city mains supplying the laboratories. These samples were stored in gasholders of 60 cubic feet capacity each. From these holders the gas was supplied to a service line connected to each calorimeter; and uniform pressure was maintained through a Connelly governor.

Because the correctness of the determination of the heating value of a gas depends so largely on the accuracy of the measuring devices, all water-weighing buckets, meters, and thermometers were very carefully calibrated before using them to make tests on the various instruments. This was done in every case as was described in last year's report. In all the tests in this investigation, the quantity of water used was determined by weighing in copper buckets. The buckets were available in sufficient numbers to supply each calorimeter; and they were all made of the same weight, so that a common counterbalance could be used. The water was weighed on a torsion balance sensitive to 0·001 lb. in 10 lbs. Each bucket, with the inside wet, was carefully balanced against the counterweight. This was done to facilitate weighing. Before balancing the wet bucket, it was shaken in an inverted position for about 5 seconds to remove the drip.

The meters used in the tests were all calibrated against 0·5 cubic foot bottle which had been previously calibrated by weighing the volume of distilled water at 62° Fahr. contained in the bottle. With this device all meters were regulated to an accuracy of 0·05 per cent. Each test on the meter consisted in passing 0·5 cubic foot of gas through at the rate to be used subsequently, which necessitated two fillings of the bottle. The meters were tested under the same pressure, and approximately the rate of flow at which they were to be used in the subsequent tests. They were again tested after the investigation was concluded. All the thermometers used in the tests were carefully compared against those of the University of Wisconsin, which had been calibrated by the Bureau of Standards at Washington and the German Bureau of Standards; and correction curves were constructed and used with each thermometer.

The Committee then proceed to deal in detail with the matters alluded to in their report. On the subject of the variation in heating value caused by a difference in temperature between the room and the inlet water, they say:

In many places where a calorimeter is installed, the water supply is taken directly from the city service-mains. In the winter, the water is much colder than the room; and this is especially true in a cold climate. In other cases, the water supply may be much warmer than the room. The purpose of this series of experiments was to determine the error that arises when the water supply is not the same as the temperature of the room. This was practically constant, for it varied only from 68° to 70° Fahr.; and the temperature of the water varied from 40° to 90° Fahr. The rise in temperature of the water at the outlet of the calorimeter over the inlet in all tests was approximately 15° Fahr., and the rate of combustion about 7 cubic feet per hour, which had previously been determined as a satisfactory point of operation.

The results of these tests show that the heating value gradually decreases as the temperature of the water at the inlet approaches and surpasses the temperature of the room. Below the room temperature, the curve bends down; and above it, the curve bends up. The change in heating value is much slower below than above the room temperature. There is a point of inflection in the curve, and at this point would be the temperature at which the calorimeter should be operated to get correct results. The exact point of inflection of this curve is not at once apparent, and it becomes necessary to analyze the sources of loss and gain at the various temperatures. If the proper corrections were made at each temperature, the resulting curve should be a straight line, since the sample of gas was homogeneous, and the calorimeter constant in its operation.

The sources of error to be investigated are: (1) Radiation or absorption of heat by the calorimeter body; (2) the sensible heat in the air and gas supplied and in the products of combustion; 3) the latent heat in the vapour carried by the products of combustion.

(1) That heat is absorbed from, or radiated to, the atmosphere by the calorimeter is due to the fact that the water supply entered the instrument at temperatures ranging from 30° Fahr. less to 20° Fahr. more than the room temperature. These various amounts of heat are determined by allowing the water to flow through the calorimeter without having any flame inside, but having the combustion chamber and vent for the products of combustion set exactly as in the other tests. The temperatures at the inlet and outlet were then taken, and it was observed that when water colder than the air flowed through, the outlet temperature was greater than the inlet temperature; and when the water at the inlet was warmer than the room, the outlet thermometer showed a lower temperature. The average amount of water passed while 0·2 cubic foot of gas could be burned at the rate of 7 cubic feet per hour was 7·339 lbs. Then per cubic foot of gas the total water would be 36·695 lbs. The heat absorbed or radiated per cubic foot of gas burnt is therefore the product of 36·695 and the change in temperature. The data and computations are tabulated below:—

Temperature o. Inlet Water. Deg. Fahr.	Change in Temperature of Water. Deg. Fahr.	B.Th.U. per Cubic Foot.	How Disposed.
40·0 ..	+ 0·2430 ..	8·920 ..	Absorbed.
53·3 ..	+ 0·1044 ..	3·835 ..	,,
59·4 ..	+ 0·0792 ..	2·905 ..	,,
70·1 ..	− 0·0036 ..	0·132 ..	Radiated.
79·2 ..	− 0·0018 ...	0·066 ..	,,
88·7 ..	− 0·0216 ..	0·793 ..	,,

At 40° Fahr. there are 8·92 B.Th.U. absorbed; at 70° Fahr., practically no heat is absorbed or radiated; while at 90° Fahr., there is only about 0·8 B.Th.U. radiated. These figures furnish one reason why the water supply should be at the temperature of the room; for then there is a thermal balance.

(2) The heat balance between the dry incoming and outgoing gas can only be obtained from an analysis of the combustible gas and the products of combustion, from which data the air supplied for combustion and the volume of the products of combustion can be computed. The combustible gas and the air supply bring in a given amount of sensible heat constantly, since the gas and air temperature did not vary appreciably during the test. At different stages in this series of tests, the products of combustion leave at temperatures different from the respective gas and air temperatures; and therefore heat is either absorbed or radiated, depending on whether the products leave at a lower or higher temperature respectively than the incoming gases. The design of the calorimeter is such that the products of combustion are cooled to the temperature of the base of the instrument, which is practically the temperature of the inlet water. Since the combustible gas is composed of some hydrocarbon gases whose combustion forms water vapour, a cubic foot of dry combustible gas burnt with the required amount of dry air will in general form a smaller volume than the combined volume of incoming gases. If, then, the incoming gases and the products of combustion, both dry, were at the same temperature, the total sensible heat in the incoming gases is still higher than the heat in the products.

In determining the sensible heat in the dry gas, that admitted and discharged may be easily calculated by observing the temperature of the room and of the exhaust products of combustion. These are shown in the following table, giving the actual heat units absorbed and discharged by the calorimeter, due to the sensible heat in the air, gas, and products of combustion.

Tests.	Room Temperature. Deg. Fahr.	Exhaust Temperature. Products of Combustion. Deg. Fahr.	Sensible Heat in Amount Gas Admitted. B.Th.U.	Sensible Heat in Products of Combustion Discharged. B.Th.U.	Actual B.Th.U.
1–4 ..	69·0 ..	45·6 ..	8·245 ..	4·572 ..	+ 3·673
5–8 ..	68·5 ..	54·2 ..	8·180 ..	5·435 ..	+ 2·745
9–12 ..	68·5 ..	63·2 ..	8·180 ..	6·340 ..	+ 1·840
13–16 ..	69·5 ..	72·4 ..	8·305 ..	7·263 ..	+ 1·042
17–20 ..	70·8 ..	81·5 ..	8·460 ..	8·170 ..	+ 0·290
21–24 ..	70·4 ..	88·6 ..	8·410 ..	8·885 ..	− 0·475

This table was constructed by taking the temperature of the room, the thermal capacity of the gas and air as indicating the sensible heat admitted to the calorimeter above 0° Fahr., and the exhaust temperature and thermal capacity of the products of combustion giving the total sensible heat discharged above 0° Fahr. The difference in these two readings indicates the sensible heat absorbed or given up by the calorimeter. It is apparent that the difference in the specific heat of the incoming and outgoing gases, and the change in volume, have only a slight influence on the heating value. Since the products of combustion of a gas

containing hydrogen are always going to be less in volume than the incoming gases, a small gain is always found when the inlet water is approximately the same temperature as the room. In commercial work, this error is negligible.

(3) The combustible gas as it enters the calorimeter is usually saturated with water vapour; and in the tests to ascertain the gain or loss of latent heat of the vapours in the gases, precaution was taken to saturate it. The air supply may be saturated to various degrees, depending on the weather conditions. Tests of the products of combustion leaving the calorimeter in all cases were only a few degrees higher than the inlet water. Tests by Dr. Immenkötter and Professor Junkers also showed that the products are saturated at the temperature of this water. If they are cooled far below the room temperature, the vapour content at the low temperature may be much less than that of the gases entering the calorimeter. Should the products leave at a temperature higher than that of the room, and be saturated, a greater amount of vapour is carried away than is brought in; and thus the latent heat of condensation is lost from the calorimeter. The combustible gas enters at 70° Fahr., and saturated 1 cubic foot of dry gas is equivalent to 1·024 cubic feet of gas saturated at 70° Fahr.; hence the vapour brought in per cubic foot of dry gas at 70° Fahr. is 0·024 cubic foot. Calculating from the analysis of the sample of gas given in the report, the dry air required for combustion in each case is 5·406 cubic feet. This air was admitted in each case at different temperatures and percentages of humidity. The required dry air in these conditions varies from 5·405 cubic feet in tests 1-4 to 5·408 cubic feet in tests 21-24; and the required saturated air for these temperatures was 5·490 cubic feet in tests 1-4 up to 5·552 cubic feet in tests 21-24. The volume of aqueous vapour then included in the air would be 0·085 cubic foot in the first test to 0·144 cubic foot in the last. This volume of aqueous vapour in the air, *plus* the volume of that in the gas, which was in all cases 0·024, made a total volume of 0·109 to 0·168 cubic foot, or, expressed in pounds, from 0·00481 to 0·00748 lb. The above figures determine the weight of aqueous vapour carried in by the gas and air under actual conditions, as shown by the various temperatures and pressures for each set of tests.

To determine the weight of aqueous vapour discharged in the products of combustion, we first calculate the volume of dry products from the analysis of the gas submitted. This gives a volume in all tests of 5·2187 cubic feet. The exhaust temperatures in each instance are taken as the actual temperatures, and run from 45·6 to 88·6° Fahr. Therefore the volume of the dry products must be expressed at these temperatures, and run from 4·98 to 5·422 cubic feet. The calculated volumes of these products saturated at the same temperature above run from 5·035 to 5·706 cubic feet. The volume of aqueous vapour in the products at this temperature would then run from 0·055 cubic foot in tests 1-4 up to 0·284 cubic foot in tests 21-24. Comparing the quantity of the products with the aqueous vapour in the air and gas admitted, it is necessary to reduce everything to a standard volume and pressure. Therefore this aqueous vapour corrected to 60° Fahr. and 30 in. bar. would be 0·0543 up to 0·2570 cubic foot, and the weight of it would be 0·00258 lb. in tests 1-4 up to 0·01223 lb. in tests 21-24.

From the above figures we have the total weight of aqueous vapour taken in and discharged; hence it is necessary to determine the total heat carried in and carried out by the vapour. Calculating this as the heat, both sensible and latent, above 32° Fahr., we have the total heat introduced to the calorimeter running as follows: Tests 1-4 give 5·3054 B.Th.U.; while tests 21-24 give 8·2504 B.Th.U. In the same way the total heat carried out in aqueous vapour runs from 2·8277 B.Th.U. in tests 1-4 up to 13·5631 B.Th.U. in tests 21-24. This gives the total heat absorbed or lost by the calorimeter from the air and gas going in and the products going out under the actual conditions of temperature and pressure; and it must be corrected for standard temperatures and pressures for a cubic foot of dry gas (0·976) to agree with the previous investigation, which gave the following result:—

Tests.	B.Th.U.	Tests.	B.Th.U.
1-4	+ 2·74	13-16	− 0·98
5-8	+ 1·74	17-20	− 3·31
9-12	− 0·36	21-24	− 5·79

It is apparent that at the higher temperatures at which the products of combustion leave the calorimeter the loss in heat energy due to the latent heat of condensation increases very rapidly, and the actual amount is large. It is necessary, therefore, to regulate the damper at the exit of the products of combustion, so that they leave at a temperature approximating that of the inlet water.

Assuming the air temperature of 70° Fahr. and the barometer of 28·7 inches, which were the mean figures during the tests, we find one cubic foot of saturated gas would be equivalent to 0·976 cubic foot of dry gas, and it would therefore carry 0·024 cubic foot of water vapour. This 0·976 cubic foot of dry gas would require at its temperature 5·406 cubic feet of dry air, which would be equivalent to 5·406 cubic feet at 0 per cent. relative humidity to 5·547 at 100 per cent. humidity. The difference between these two would be the volume of water vapour carried by the air required for combustion. It would be equivalent to *nil* at 0 per cent. relative humidity, and to 0·141 cubic foot at 100 per cent. humidity or saturation, measured at 70° Fahr. and 28·7 inches of the barometer. The sum, then, of the vapour carried by the gas *plus* the vapour carried by the air would be 0·024 cubic foot at 0 per cent. to 0·165 cubic foot at 100 per cent. Reducing this to 60° Fahr. and 30 inches gives 0·02252 to 0·1548 cubic foot; or expressed in pounds, it would be from 0·001072 for 0 per cent. to 0·007375 at 100 per cent.

The actual volume of dry gas burnt has been 0·976 cubic foot. From former calculations, 5·219 cubic feet of dry products of combustion are obtained from 1 cubic foot of saturated gas, which is equivalent to 5·358 cubic feet of gas saturated. The difference, 0·139 cubic foot, is the volume of water vapour carried out by the products of combustion, measured at 70° Fahr. and 28·7 inches. Reducing this to 60° Fahr. and 30 inches gives us 0·1305 cubic foot. This would weigh 0·00621 lb., which is the weight of water vapour carried out of the calorimeter by the products of combustion. Subtracting this quantity, which is constant, as the products always leave saturated, from the weight of water vapour carried into the calorimeter by the air and gas under the different conditions assumed, we have the following quantities of water vapour gained or lost by the calorimeter: 0·00514 lb. was lost at 0 per cent. and 0·00117 lb. was gained at 100 per cent. Multiplying this mass of water vapour by its heat of vaporization at 70° Fahr., we have the actual heat in B.Th.U., which was gained or lost by the calorimeter by the combustion of one cubic foot of saturated gas at 70° Fahr. and 28·7 inches. Correcting to 60° Fahr. and 30 inches, we have—

Humidity.	Corrected.	Humidity.	Corrected.
0 per cent.	− 5·900	75 per cent.	− 0·303
25 ,,	− 4·155	100 ,,	+ 0·858
50 ,,	− 2·130		

One cubic foot of saturated gas at 70° Fahr. contains 0·976 cubic foot of dry air, carries 0·024 cubic foot of aqueous vapour, requires 5·406 cubic feet of dry air for combustion, and yields 5·219 cubic feet of dry products of combustion, equal to 5·358 cubic feet of saturated products, and will carry 0·139 cubic foot of aqueous vapour in products of combustion, or 0·1305 cubic foot at 60° Fahr. and 30 inches of the barometer.

The Committee then give particulars of their tests of various calorimeters, and come to the following

Conclusions.

After this second year's investigation, your Committee are convinced that the general instructions and precautions given in the report of 1908 are correct, and need but little modification. A few words might be said, however, in regard to the general selection of calorimeters and measuring instruments.

With reference to the gas-meter, the specifications as given in 1908 are to be commended. Further experience has shown that the meter with the internal overflow has been the cause of many erratic readings in some very important investigations. We recommend that this type of meter be discarded, and only that with the exterior water-gauge glass be used, and that the meters be calibrated and tested at the pressures and rates of flow at which they will be employed.

With reference to thermometers, we recommend that great care be used in their selection, and that those that are used in measuring the inlet and outlet water temperatures should be calibrated in every case. We would recommend for all commercial purposes the selection of thermometers in accordance with the description noted in the report.

The type of calorimeter to be used was described in last year's report; and the Committee have few remarks to make further on this point, except that it is preferable to have an instrument that is so made that the interior is accessible for cleaning purposes. After continual service with impure water, there will be deposited mud or scale on the interior water channels, which will tend to decrease the efficiency and general accuracy of the calorimeter.

The placing of the thermometers on the same level is recommended, as last year it was shown that suitable calorimeters can be made with this object in view.

This work has enabled us to extend the field of our investigation, as suggested in the 1908 report, and enables us to reaffirm last year's directions for the use of calorimeters. It clearly shows the relative effect of the several possible sources of error not covered by last year's work.

A Centenarian Pensioner of the South Metropolitan Gas Company.—We have received from Mr. Walter T. Layton, the Editor of the South Metropolitan Gas Company's "Co-partnership Journal," an advance page of the issue for the current month, containing a short notice by him of Mr. John Durant, who to-morrow will celebrate the hundredth anniversary of his birth. The late Sir George Livesey in the "Co-Partnership Journal" for September, 1908, gave some particulars of the life of this old and faithful servant of the Company, who worked as a bargeman from 1842 to 1883. He is the last survivor of those who were in the Company's service in 1850. Mr. Layton says he is sure he is expressing the feelings of every co-partner in wishing "the good old gas worker all the peace and comfort it is possible for him to enjoy during the remainder of his life here." He adds: "In John Durant we have a link with the days when gas lighting was as great a wonder as the aeroplane. This old, old man connects us with the period before the battle of Waterloo, when London was without many of the comforts of civilization which are now available in regions which were at that time unexplored."

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

The proceedings at last Friday's Meeting of the London and Southern District Junior Gas Association—which was held at the Cripplegate Institute, Golden Lane, E.C., under the chairmanship of Mr. W. J. LIBERTY, the President—were of a varied character. The first item on the *agenda* was a paper; and this was followed by the discussion of a series of questions.

Mr. C. E. ROSEVEAR, Distribution Superintendent to the Hythe and Sandgate Gas Company, was the writer of the paper, which was entitled

NOTES FROM HYTHE.

In opening, the author explained that his object in presenting the notes was to put before the members the present state of the Distribution Department of the Hythe Gas Company as compared with that which existed nine months ago, when he was appointed Distribution Superintendent. On taking up his duties, he found much that needed attention and revision; and eventually he had no alternative but to discharge the men who were there (with the exception of two), and take on a fresh lot. In place of the unsatisfactory method then in vogue for dealing with maintenance materials, he had maintenance books made out, in which a record is kept by the storekeeper of all materials issued for maintenance, and for whom. The fitter has to obtain a signature in his book for attendance and material employed. The result of this has been that, with fortnightly attendance, the consumption of mantles for nearly 200 burners is only about fifteen. Previously mantles had been taken from the stores at the rate of forty or more per week. The stock of old cookers he had cleaned up, and new parts and fittings supplied; and the meters were tested. He also set about compiling a list of the syphons, and prepared a schedule of the mains, with their sizes—the positions and depths being added as ascertained. In addition, he caused accurate records to be kept of all services laid and materials used for them. Particulars of all free fixing are kept; and details of estimates and charge work are entered in a fittings cash book.

The number of consumers at the date of his arrival on the scene, last May, was about 1025; whereas there have since been added 160 new supplies—an increase of about 16 per cent. On Oct. 1, owing to a re-arrangement of the area of supply between the Folkestone Gas Company and the Hythe Company, the latter lost 81 consumers. As a matter of fact, when he first went to Hythe they, as occasion required, took gas from Folkestone; whereas the position now was that they supplied Folkestone with a certain quantity. For the year ended June 30, 1909, the leakage amounted to about 21 per cent.; while for the six months to Dec. 31 it was only about 6 per cent. This great reduction was due to several things—such as removing wooden plugs and properly capping off the mains, exchanging slow and stopped meters, and remedying escapes on mains and services; but it was chiefly through fixing the station meter on the outlet of the holder. On the new main to Saltwood (completed in October last) there are nearly 100 consumers, of whom only 18 are old customers transferred to the new main.

There is competition in Hythe, from the Folkestone Electricity Supply Company; but he was glad to say he had turned electricity out, either wholly or partially, of a good number of places. In this connection, he cited an incident at the Hythe Summer Theatre, where electricity was replaced by gas during the past season. For some years the theatre had been lighted by electricity, but without giving real satisfaction; and on the opening night of the concerts last season, the lights failed entirely in the auditorium. On many other occasions the illumination was poor; and at last the patience of the proprietor (Mr. Cardiff) came to an end. He wrote to the Company stating that he considered the lighting most unsatisfactory and the charges excessive. His concluding sentence was: "For your own credit, as well as in common justice to me, I rely upon you to see to it at once that my lighting bears some relation to its enormous cost." An interview followed, when Mr. Cardiff indignantly protested to the Chief Engineer of the Electricity Company against charges for light which had not been supplied, thereby breaking the contract between them. This resulted in the Company intimating that they would be sending in their accounts weekly, with 24 hours' grace; and if they were not paid, the supply would be cut off. This was in spite of the original contract for fortnightly accounts, with seven days' grace.

One day, hearing Mr. Cardiff make public allusion to the trouble, Mr. Rosevear approached him in reference to a supply of gas, with the result that at 8 o'clock the following morning Mr. Cardiff informed him that he wanted gas in for lighting by 7 that evening. By 9 a.m., three fitters were hard at work fitting up the stage, fly, and foot lights; the assistance of a local gas-fitter and another man being also requisitioned. The service from the main was 150 feet long, and had to cross a road, under rails on which trams passed about every twelve minutes. This meant a considerable delay, as the horses had to be taken out, and the trams pushed over the trench. However, by 7 o'clock the arrangements were nearly completed; and about 7.30 the lights were being tried. Of course, there was still much to be done; but in the short time at his disposal, Mr. Rosevear was able to provide the following lights: For the auditorium, four standard inverted burners; for the stage, one 2-light Graetzin lamp with parabolic reflector and five standard inverted burners, while the fly-lights consisted of four bijou burners inside Chinese lanterns, with a row of 25 flat-flame burners for the footlights; in the dressing-rooms, there were two bijou burners in one case, and one bijou and one standard in the other; and for the ticket office, there was a standard burner.

Mr. Cardiff was delighted with the effect, and publicly congratulated the Gas Company on the good light provided. When the costs were ascertainable, they were advertised in the local papers, much to the chagrin of the Electricity Company, as they showed a saving, by using gas, of £1 1s. 4d. per week of eight concerts.

Mr. Rosevear also secured for his Company the contract for lighting the new post office at Hythe. In the sorting room some of the pendants are 10 feet long; and the lighting consists of 19 Bray inverted burners. The entrance to the building is illuminated by a 700-candle power Lucas lamp; and the letter-box, clock, and mails notice by a two-light Graetzin lamp. The rooms above for the use of the postmaster are now being fitted up. There is also a proposal afoot to erect a roller skating rink; and Mr. Rosevear is looking forward to installing there a Keith high-pressure system of lighting.

At the conclusion of his paper, the author was asked a number of questions; and to these he replied as they were put to him.

Mr. ROSEVEAR said, with reference to his statement that the reduction in the leakage account was chiefly owing to the removal of the station-meter from the inlet of the holder to the outlet, that they did not now register the gas going into the holder. The reason why this was done was because, as no doubt many of the members were aware, the Hythe Company had an arrangement with the Coalite Company for a supply of gas. The Coalite Company said their plant would be capable of manufacturing a very much larger quantity of gas than the Hythe Company could take; and by thus placing the meter, of course, they only paid for such gas as they actually did require. They only had the holder pressure. This threw 4 inches; and the meter took 1-10th inch. As to maintenance, when he went to Hythe, he found each man had been in the habit of taking out whatever mantles he wished. He, however, prepared maintenance books, in which the men had to get a signature from the consumer for mantles and also for attendance at the premises. The reduction by this means was from 80 mantles to 15 in a fortnight, for nearly 200 burners. Of course, their own gas-works plant was still in existence; and it was used by the Coalite Company, who had taken over the works entirely. The Hythe Company got a profit on all the gas they supplied to Folkestone. In November and in December, the Folkestone Company took 1½ million cubic feet—that was, 3 million feet in all. At Hythe, they had two rates for gas. For lighting and heating, the charge was 4s. 2d. per 1000 cubic feet; and for power, 3s. 7d. Sandgate they used to supply at 3s. 4d., because the Folkestone Company also supplied the place at this rate. In 1908, the Hythe Company was put down as a 20 million cubic feet undertaking. In 1909, 26 millions; and he expected that for 1910 it would be from 40 to 50 millions. In each of the last two months, they had sent out over 4 million cubic feet of gas. Their practice was to fix cookers free up to 10 feet, and heating stoves up to 15 feet. They took the gas from the Coalite Company purified and ready for sale; and they paid so much per 1000 cubic feet for it, measured by the station meter. They had no gas examiner at Hythe. Really, he wished they had, because he felt sure if they had an official gas examiner they would get on much better. There was only one holder. The inlet and outlet were very near together; and what went in passed almost straight out again. The Coalite Company were supposed to supply them with 16-candle gas; but he could not say whether there was any penalty attaching to a breach of this agreement. He had no calorimeter with which to test the heating power of the gas. As to other matters, if consumers wished to have their meters tested, the Company would do this themselves. If, however, customers desired them to be sent away for testing, they had to pay the cost. It was generally found that people were willing to accept the Company's test. Electricity was supplied at the present moment at 6d. per unit; but there had been talk of reducing the charge to 5d. The Gas Company, too, were considering the advisability of making a reduction next July—the beginning of their financial year. For maintenance, the Directors had decided to make an all-round charge of 6d. per burner per quarter, for all kinds of lamps, inside and outside. For this, they cleaned globes, but did not renew them; and they only allowed one mantle per burner per quarter.

The PRESIDENT said they did not come across a Hythe gas-works every day; and when they did, it was interesting to have someone to tell them about it. He would venture to say that it was owing in a great measure to one of their members, Mr. Rosevear, going down there that things were in such an improved state. The work that he had accomplished reflected great credit on Mr. Rosevear.

Mr. L. F. TOOTH (the Senior Vice-President), in proposing a hearty vote of thanks to the author, said the position of Hythe was certainly unique. They were indebted to Mr. Rosevear for having given them the benefit of his experience.

Mr. S. A. CARPENTER (Hon. Secretary), seconding, remarked that they had learnt some things, not to follow, but to avoid.

The resolution was carried with applause, and briefly acknowledged by Mr. Rosevear.

A PRESENTATION.

The PRESIDENT said that this being the first meeting in the New Year he was pleased to pass on to the members greetings which had come to the Association from Mr. J. W. Helps, the President of the Institution of Gas Engineers, and Mr. J. Paterson, the President of the Senior Southern District Association of Gas Engineers and Managers. Among other letters he had had, he might mention those from Mr. S. W. Shepherd, President of the Yorkshire Junior Association, Mr. Corbet Woodall, Mr. D. Milne Watson, Mr. F. W. Goodenough, Mr. J. M. Campbell, of Margate, and Mr. W. B. Farquhar, of Ilford. They all wished the London and Southern Junior Gas Association prosperity during the coming year; and he was sure the members would highly appreciate these good wishes. In addition to the twenty new members welcomed at the last business meeting, there were now fourteen others—making 34 since the beginning of the session. Another matter to which he wished to refer was the annual dinner, for which they had already had some sixty acceptances. Beyond these, there were the new members; and, further, it had been decided to give all members the privilege of introducing a friend. In connection with this function, he might say that the Joint Council of the Junior Associations of England were intending to hold their meeting in London in February; but as the date came so near the dinner, the Association wrote to Mr. A. L. Holton, of Manchester, the Secretary of the Joint Council, and asked him to fix the meeting for March 5, so that the business could be transacted in the afternoon, and the visitors could be present at the dinner the same evening. Mr. Holton had accepted the invitation, and was making arrangements accordingly. As to Dr. Colman's lecture on March 18, it would be the privilege of every member, subject to the Council agreeing, to introduce a friend; and if they intended taking advantage of this, they should let the Council know at once. He had already had intimations that some of the Seniors, and others connected with the gas industry, intended to be present on the occasion. The duties of the President of an Association of this character were multifarious, and very pleasant; but he did not think there was any that had given, or would give, him greater pleasure, during his second year of office, than the one he had now to perform. He might recall that on Mr. J. G. Clark relinquishing recently the office of Hon. Secretary, which he had so ably filled for three years, it was decided by the Council not to let him go without some slight recognition of his valuable services. Mr. Clark took on the secretaryship when the Association was a small one; and he put all his energies into the work, and helped to make the Association what it now was. A small Sub-Committee in whose hands the matter was left had therefore had framed the following resolution, which was passed at the last annual meeting; and he had the greatest possible pleasure in asking Mr. Clark, in the name of the Association, to accept it:—

> **The Annual General Meeting of the London and Southern District Junior Gas Association herewith places upon record its hearty appreciation of the valuable services rendered by Mr. J. G. Clark during the three years he has held the office of Honorary Secretary; and on his relinquishing that office, tenders to him its sincere thanks for the energy and time given, and the interest he has at all times displayed in everything that pertains to the welfare of the Association.**

Mr. CLARK (who was the recipient of hearty applause when the testimonial was handed to him) remarked that it was adequate compensation for any work connected with the Association to know that in performing it he had made such a large number of friends. It was a suitable occasion on which to say how much he himself felt indebted to the Association—that was, how much he had profited from contact with the members. The Association was composed of representatives of every branch of the gas industry; and with the growing complexity of their business, they could not have too much mutual intercourse. Whenever he had felt doubt on any subject, and had known a member capable of giving him the information he desired, he had taken full advantage of the opportunity of securing it; and this was a facility that was open to all the members. He thanked them very much for the excellent testimonial they had given him; and could assure them that he would continue, as he had always done, to take a great interest in the Junior Association—knowing that he had himself profited by the Association, and that its existence could not fail to be of benefit to others as it had been to him.

QUESTIONS.

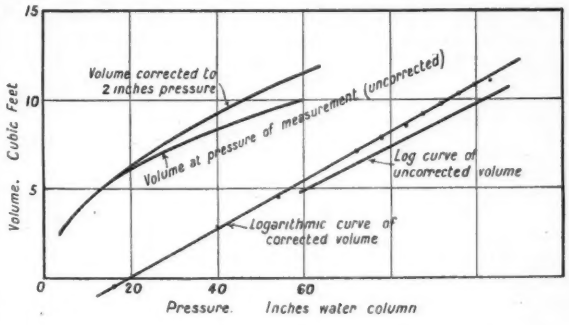
A list of questions (most of which had been sent in to the Hon. Secretary before the meeting) was then submitted to the members; and answers to them were suggested by different speakers. The first one was as follows:—

> *What is the Relation between the Pressure at an Incandescent Burner and the Volume of Gas Passed? Does the Square Root Law Hold in Practice.*

Mr. J. G. CLARK remarked, after a pause, that perhaps, as the member responsible for putting the question, he might be allowed to give an answer. He thought it was an important question, dealing, as it did, with a subject that was often cropping up. It would be a good thing to be able to know how much a burner would pass at a high pressure, from the knowledge of what was the consumption at a low pressure. In its practical aspect, the problem appeared to be rather a complex one. It was a well-known fact that the discharge of gas through an orifice was proportional to the square root of the pressure, all other conditions remaining constant. If the gas was discharged into a chamber, the pressure in which was that of the atmosphere, then the pressure which determined the discharge was the pressure behind the orifice. This was, of course, the condition existing in bunsen burners where practically the whole of the pressure energy of the gas was converted into velocity. If any condition should arise where the gas was discharged from the orifice into a chamber where the pressure was not that of the atmosphere, then the discharge would depend upon the differential pressure. As a general statement—

If p_1 = the pressure behind the orifice
p_2 = the pressure in the discharge chamber,
then discharge is proportional to $\sqrt{p_1 - p_2}$

From a practical point of view, it must be remembered that, when gas was burned in a bunsen burner, the burner became heated. The heating effect reached the injector, and to this extent modified its dimensions. At the same time, the gas, in passing through the heated injector, also became heated, with, of course, change of volume. This heating effect would increase with the consumption, and therefore with the pressure. Summarizing the matter, they saw that a change of pressure would alter the conditions in the following ways: (1) Increase of static pressure behind the injector. (2) Modification of the nipple by expansion due to heat. (3) Heating of the gas in its passage through the injector. The two latter effects would vary enormously with different types of burners. It appeared, therefore, that the effect in practice was rather complex, and anything like mathematical analysis failed. Under these circumstances, the only thing to be done was to resort to experiment. He had made, a few days previously, an experiment which was interesting as bearing on the question. An upright burner, having a single hole nipple pierced in a thin metal plate, was subjected to pressures varying from 2·2 inches to 60 inches; the gas being consumed at the burner-head in the ordinary way.



Four curves were shown; two with pressure plotted against volume, and two logarithmic curves of the same quantities. The slope of the logarithmic curves shows the following relations—

Volume discharged at pressure of measurement is proportional to $\sqrt[2\cdot05]{P}$

Volume discharged corrected to 2 inches pressure is proportional to $\sqrt[1\cdot82]{P}$

The pressure of measurement was practically identical with the pressure behind the nipple. The diagram showed that the volume discharged, if measured at the pressure behind the injector, is practically proportional to $\sqrt[2]{P}$; so that, if a correction is made in accordance with Boyle's law, a very near approximation should be obtained. The calculation would then be as follows:—

Let V_1 = volume discharged at pressure P_1 and measured at P_1.
V_2 = " " " " P_2 " " at atmospheric pressure,

$$\text{then } V_2 = V_1 \times \sqrt{\frac{P_2}{P_1}} \times \frac{P_2 + A}{A}$$

where A is the pressure of the atmosphere, which is, of course, the datum of gas pressures.

The corrected volume V_2 was the volume to be charged to the lamp and to be paid for. If they measured gas at 54 inches pressure, it was necessary to add 13¼ per cent. to arrive at the volume at standard pressure. In conclusion, he suggested that the subject might form a very instructive and interesting research. It meant taking a number of typical burners, and running them through a range of pressures, to see whether some general method of calculating could be arrived at. Perhaps one of the members would undertake the work. As he had already pointed out, the degree to which burners became heated varied enormously; and on this account it would be unsafe to generalize from the experiment he had described.

Mr. E. G. STEWART remarked that some "C" burners were provided with five holes; but he noticed that the burner Mr. Clark had experimented with possessed only one. Did Mr. Clark think that with five holes the increased friction at a high velocity would alter his law?

Mr. CLARK said he did not think so. There would be five times the friction, but there would also be five times as many holes. He selected purposely a one-hole burner, because this was the most efficient form of nipple they could have for high-pressure work. He had more in mind the inverted system, in which they had to propel the gas against its gravity. He thought if they had (say) a three-hole nipple, the proportional effect would be much the same.

Mr. PARK asked whether Mr. Clark had considered the question from the point of view of the specific gravity of the gas.

Mr. CLARK remarked that, if the specific gravity varied, that was another question. When it was stated that the volume was proportional to the square root of the pressure, this was assuming that the specific gravity was constant. The experiment he had referred to was carried out within a short period, so that the specific gravity would be quite constant. This element did not therefore enter into the question. Of course, there were certain cases where specific gravity must be taken into serious consideration, as for instance certain high-pressure air-gas systems. Assume that the mixture supplied to the burners was, gas two parts, and air three parts, and that the specific gravity of the gas was 0·46. Then the specific gravity of the mixture would be the arithmetical mean, that is—

$$\frac{(\cdot46 \times 2) + (1 \times 3)}{5} = \cdot78$$

In designing installations for such a system, this higher specific gravity must be taken into consideration because, not only was the mixture of higher gravity than pure gas, but for a given gas consumption the quantity to be supplied would be 2½ times as great. The effects of specific gravity and pressure might be combined as

$$V \text{ is proportional to } \sqrt{\frac{P}{S}}$$

The PRESIDENT said Mr. Clark had set himself a most interesting question. He presumed one of the points that would concern most of those present, as they had to do with high-pressure gas, would be the amount charged for the difference in pressure. Mr. Clark had furnished them with this information. Given gas at a pressure of 54 inches of water, or 4 inches of mercury, the consumption equalled 88 cubic feet at high pressure, as against 100 cubic feet at ordinary pressure. With regard to the future, he thought it would be very nice to devote an evening to this subject; and he did not know anyone in the gas industry better able to take up the question than Mr. Clark.

In Photographs of High-Pressure Installations, the Writer has Noticed that the Mantles often Appear quite Black, though the Lamps otherwise show up well. What is the Reason, and what is the Remedy?

Mr. WEDD said that the cause of what the questioner drew attention to was excessive exposure; and he did not know that any certain remedy could be suggested. It might, however, be beneficial to use a 10 per cent. solution of bromide in the process of developing.

It is Proposed to Light a Public Building or House in the Following Way: A Live Carcase of Bye-Pass Tubing is installed, terminating in a Pilot-Light at each Burner. The Fittings are not Provided with Taps, as the Supply of Gas to the Burners will be Controlled by Switches or Taps Placed in More Convenient Positions, as, for Example, just inside the Door of Each Room, in the case of a House. What will be the Advantages and Disadvantages of such a System?

The PRESIDENT said he presumed that, by having a switch outside the door of a room, it would be necessary to light up all the burners, whether they were wanted or not.

Mr. BEHENNA pointed out that the separate pipes could be arranged with Norwich switches near the door, so that as few or as many burners as might be desired could be lighted up.

A MEMBER said a disadvantage in having the switches far away would be that, if any length of time passed without lighting up, the pipes would be charged with air, and there would be trouble in lighting, unless they had mercury seals to all the fittings.

What are the Advantages and Disadvantages of a Great Quantity of Liquor in the Hydraulic Main—that is, Good Depth and Width at the Dip?

Mr. E. G. STEWART remarked that one big disadvantage was the fact that they got greater oscillation. He knew of a place where there were two hydraulics, one on either side of the bed. Six retorts discharged into one main, and four into the other. On one side, where the six pipes were, they got ½ inch oscillation; and on the other side, with the same area, but four pipes instead of six, they had from 1½ to 2 inches. This was one great disadvantage of having a large area at the dip. Another was that it gave the tar a good opportunity to fall to the bottom out of the way. A lot depended on the arrangement of weir-valves and tar-cocks on the main.

Mr. WEDD thought it should not be overlooked that there must be sufficient liquor available at the dips to prevent any possibility of unsealing of the dip-pipes by back-pressure.

Whether, in these Days of Keen Competition, Compulsory Deposits are an Advantage to a Gas Company?

A MEMBER expressed the opinion that it entirely depended on the consumer. If there was a customer they were rather afraid of, they should by all means insist on a deposit; but in the case of a man who could be trusted, this should not be done.

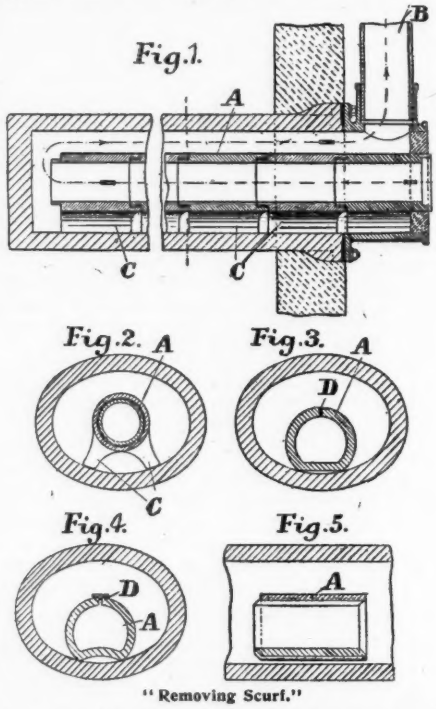
Mr. ROSEVEAR said that at Hythe they assumed everyone to be an honest man, and never took a deposit, either in connection with ordinary or prepayment meters. They had nearly 1200 consumers—700 of them on the prepayment system—and they had about three defaulters annually.

We have very keen competition at Ilford. They are placing all kinds of Electricity Apparatus—Irons, Radiators, and so on—Free of Charge on Trial. Is this a sign for the Gas Companies to start something in the same direction?

The PRESIDENT thought that all articles consuming gas for industrial purposes should be pushed as much as possible. In the case of such appliances, his answer to the question would most decidedly be "Yes."

REMOVING SCURF FROM RETORTS.

A patent has been taken out for France by M. Rudolph Tenckhoff, for an appliance for removing scurf from gas and other retorts by the introduction of a current of air conveyed into the retort by means of a pipe consisting of several parts which can be detached from each other from the outside. By this arrangement, the air can be directed on to any desired point, and a uniform removal of the scurf ensured. The accompanying diagrams show several applications of the invention.



"Removing Scurf."

The pipe A consists of several pieces fitting one into the other; the joints being made up with fire-clay. In the ordinary way, no air can escape at the joints of the pipe. But the ends may be subsequently parted by means, for example, of a hook introduced into the pipe, so that the air may issue through the interstices produced. The heated air passes away by the ascension pipe B after the opening of the lid of the mouthpiece.

In the applications of the invention represented in figs. 1 and 2, the pipe ends are provided with feet C, by which they are supported from the floor of the retort. In those represented in figs. 3, 4, and 5, they rest directly on the retort, and are flattened or bulged as shown. On the opposite side, the pipe ends have a slit D, which prevents the pipes from being cracked by expansion or contraction. The slit is closed before the pipes are put in position (see fig. 3), or it is covered by a small plate laid upon it (see fig. 4). In some cases, however, it may remain open.

The arrangement described is applicable not only to horizontal, but also to inclined, semi-inclined, and vertical retorts of all kinds; the forms of the pipes and their positions in the retorts being varied as required.

A pressure main of reinforced concrete, 36 inches diameter inside and 334 feet long, is in use at Salt Lake City. The maximum static head which it withstands is about 20 feet of water. The thickness at the top of the section is 6 inches, and at the sides 7 inches. The bottom is constructed in the form of a section of an octagon, with a minimum thickness of 6 inches, and the reinforcement consists of ⅜-inch square twisted steel bars, spaced 8 inches on the centres. This conduit has been in use seven years, and, according to the City Engineer (Mr. G. O. Chaney), is in first-class condition.

RELATIVE ADVANTAGES OF GAS & ELECTRICITY

Discussion at Manchester.

At a Meeting of the Manchester Association of Students of the Institution of Civil Engineers, last Wednesday evening, at the Chartered Accountants' Hall, Manchester, the subject for discussion was the "Relative Advantages of Gas and Electricity." In the circular sent out to members by the Hon. Secretaries, it was suggested that the following prices be used for comparisons of cost: For lighting—Gas at 2s. 6d. per 1000 cubic feet; electricity, at 3d. per B.T.U. For heating, cooking, and power—Gas at 1s. 8d. per 1000 cubic feet; and electricity, at 1d. per B.T.U. The points set for discussion included street lighting, indoor lighting, heating, cooking, power, comparisons of cost of the rival systems, ventilation and health, cleanliness, convenience, safety, and decoration. In the absence of Mr. J. G. Newbigging, M.Inst.C.E., President of the Association, Colonel H. T. CROOK, the immediate Past-President, took the chair. Those present included several prominent members of the Manchester and District Junior Gas Association.

STREET LIGHTING.

Mr. FRANK H. ROBINSON, Assoc.M.Inst.C.E., Engineering Assistant at the Manchester Corporation Gas-Works, opened the discussion on the side of gas. Street lighting, he said, was a subject upon which the most animated discussions took place between gas engineers and electricians, and was often the cause of much argument in council chambers, as it touched the public purse. In dealing with this part of the subject, he wished it to be understood that neither flat-flame burners nor carbon filament lamps were referred to, as these were out of date, and it was not in the best interests of either industry to use them. Low-pressure incandescent gas-burners were, in his opinion, very suitable for lighting the streets. They gave a steady, well-diffused light, and were easily adapted to existing columns without great expense and auxiliary plant. It might be argued that the mantles were fragile. Well, so were metallic filament lamps. When an incandescent mantle did break, there was still some light produced by the remaining part of the mantle; but when an electric lamp broke, that part of the street was plunged into total darkness without a moment's warning. At Hastings, some metallic filament lamps had been installed in close proximity to ordinary incandescent gas-lamps; and the following extracts from letters to the local papers showed what the people thought of them: "The spending of the ratepayers' money has produced something less efficient than they had before." "No one ventures to say the new light is better than the old one—indeed, anyone with eyes in his head can see for himself that it is far poorer." "The result of the lighting is a lamentable failure; it is distinctly worse than before." A similar example to this was to be found at Gildabrook Road, Eccles, where the Salford Corporation incandescent gas lighting changed to the Eccles Corporation electric lighting with metallic filament lamps. It was just like passing from day into night to go across the boundary from Salford into Eccles.

COST.

Turning to the question of cost, Mr. Robinson demonstrated his points by the following particulars on the blackboard—assuming a total illuminating power of 180 British standard candles, and the hours of lighting 4000 per annum.

Gas Lighting with Upright Burners.

	Yearly Cost.
Three burners, each 60 c.p., chimneys, rods, and mantles, Total 5s. Depreciation, 20 per cent.	1s. 0d.
Gas, 4000 hours at 3 cubic feet per burner, equals 36,000 cubic feet at 2s. 6d. per 1000	4 10 0
Thirty new mantles for three burners, at 3d.	7 6
Chimneys, 15 at 2d.	2 6
Fixing above	4 0
Lighting and cleaning	1 0 0
Total cost per lamp per annum	£6 5 0

Electric Metallic Filament Lighting.

	Yearly Cost.
Two osram lamps per annum, 180 c.p. each—British	£1 7 0
Current, 4000 hours at 220 watts per hour, equals 880 units at 3d. per unit	11 0 0
Cleaning and general maintenance	15 0
Total cost per lamp per annum	£13 2 0

This comparison, it was explained, was made between the three cheap upright incandescent gas-burners of a total illuminating power of 180 candles, and a modern osram lamp of 180 c.p., of an efficiency of 1·2 watts per candle, and taking the actual figures given in the makers' catalogues, which would certainly not be to the disadvantage of the lamp. The cost given for lighting, cleaning, mantles, &c., in the case of the gas-lamp was the actual expenditure in Manchester for such a lamp. If tantalum lamps were used instead of the osram, the difference between gas and electricity would be still greater, for the highest efficiency of these lamps was 1·7 watts per candle.

SYSTEMS COMPARED.

The next systems compared by Mr. Robinson were high-pressure gas lighting and electric arc lighting. The latest example of high-pressure lighting with inverted burners was that in Fleet Street, London. After much investigation, the authorities had adopted this system as the best means of lighting the streets at the present day. In Germany and many other places in Europe, high-pressure gas lighting was rapidly displacing electric arc lighting; Berlin being foremost in this respect. The whole of the streets in that city were in future to be lit in this fashion. An average of eleven large towns on the Continent gave the cost of electric arc lighting—enclosed and flame—as 81·5 per cent. higher than high-pressure gas lighting, with 22 per cent. less candle power. High-pressure inverted burners would give 60 candles per cubic foot of gas, and consume 25 feet per hour. Thus, for gas alone, at 2s. 6d. per 1000 feet, 1000-candle power for one hour cost 0·5d. Flame arcs with alba carbons gave 3·4 candles per watt. Therefore, for current alone, at 3d. per unit, 1000-candle power for one hour cost 0·9d. Again, the maintenance and renewal of carbons was a heavy item to be reckoned with in the case of arc lamps. The actual cost per annum of the high-pressure gas-lamps in London was £15 2s. 6d., including gas, mantles, cost of compression, and general maintenance, reckoning gas at 2s. 3d. per 1000 feet. One point of advantage might justly be claimed for the electric light, that was the ease of lighting and extinguishing the lamps; but this advantage was disappearing with the advent of automatic lighters, worked from the gas-works by a wave of pressure at dusk and dawn.

INTERIOR LIGHTING.

Proceeding to discuss the relative merits of gas and electricity for interior lighting, Mr. Robinson said that until the introduction of the pneumatic gas-switch somewhere about three years' ago, electricity had the undoubted convenience, not possessed by gas, of ease in lighting and extinguishing from a distance. There were now several gas-lighters on the market for distance control which had taken away this advantage. In the Alexandra Palace, London, Keith's high-pressure inverted lamps had been installed; and they were all worked and controlled from the compressor room. In fact, the majority of new installations of high-pressure lighting were controlled from switch-boards. Then as to the cost of interior lighting with inverted gas-burners at ordinary pressure and osram lamps, taking 1000 hours' lighting for a candle power of 60 in each case, they obtained the following results:—

Gas Lighting.

Gas, 3 cubic feet per hour at 1000 hours equals 3000 cubic feet at 2s. 6d.	7s. 6d.
Mantles, four at 6d.	2 0
Depreciation of burner	6
Total cost per 1000 hours	10s. 0d.

Electric Lighting.

Current, 80 watts per hour at 1000 hours equals 80 units at 3d.	£1 0 0
Half life of two lamps at 4s. 3d. per lamp	4 3
Total cost per 1000 hours	£1 4 3

NOTE.—Two 40 watt lamps are required for 60-candle power (British). Life of lamp, 2000 hours.

Thus, with the best metallic filament lamp, the full efficiency as stated by the makers and the maximum life of the lamp taken, electricity was still two-and-a-half times dearer than gas, even when a low efficiency and a good allowance for mantles and depreciation of burner were allowed with the gas-burner. In West Ham, a large drapery establishment had given up electricity for gas. The 153 electric lights—arc and filament—had been replaced by 143 inverted high-pressure gas-lamps. There was now a much better light; and the lighting bill was less than half its former amount with electricity. The inverted burner, with its soft, shadowless light and higher efficiency, had come to stay. It was as much an advance on the upright burner as the metallic filament electric lamp was on the carbon filament lamp. Electricians could no longer claim their lamps to be superior as regarded a light without shadow.

HEATING AND COOKING.

As to heating, Mr. Robinson said it was an accepted fact that the same amount of heat might be obtained from 6 cubic feet of coal gas as from a unit of electricity. Gas at 1s. 8d. per 1000 cubic feet would give 30,000 B.Th.U. for 1d.; while electricity at 1d. per unit would give only 3424 B.Th.U. On this score alone, electricity was hopelessly beaten in heating. Then, in cooking, gas held a foremost place easily with its cleanliness, ease of manipulation, and general economy. An electrical engineer made the admission, a few weeks ago, at a meeting of electrical engineers, that electricity could never seriously compete with gas for cooking and heating so long as 6 cubic feet of gas yielded as much heat as a unit of electricity. In regard to questions of ventilation and health, Mr. Robinson said that some time ago experiments were made in well-ventilated rooms lit by gas and by electricity, with a view to ascertaining the relative foulness of the air after lighting by the two systems for an equal period—persons being in the room the whole time. At the conclusion of the tests, the air in the room after gas had been used was less charged with carbonic acid than after electricity had been used; the reason being that gas heated the air more than electricity, and the upward current of air was therefore moving at a greater rate than with electricity, so changing the air much oftener. The stuffiness of rooms was not so much due to the burning gas as to bad ventilation. As to gas-fires, let them see what the doctors as a body thought of them where health was concerned. No less than 1000 gas-fires had

been fixed during the past two years for the medical profession in London alone. This was their answer to the question. On the score of cleanliness and convenience, Mr. Robinson said they must give way to electricity. But the advantage in convenience, he submitted, was fast disappearing with the introduction of the pneumatic gas-switch, spark ignition, and other distance lighting devices. In this connection, he pointed out that now and then electricity proved extremely inconvenient by suddenly failing.

THE QUESTION OF SAFETY.

Electricians had talked a good deal about the safety of electricity as compared with gas. But what about the fatal fire a few years' ago in the Dingle Tunnel, Liverpool; the explosion at the Victoria Hotel, Manchester, last year; or the recent fire, with terrible consequences, at Clapham Junction—all due to electricity? Many such instances could be recorded. In Glasgow, 61 fires in six years were due to defective wiring alone. The report of the London Fire Brigade showed that last year the fires caused by electricity exceeded those caused by gas in proportion to the number of each class of consumer. With electricity, the mischief went on unseen until the place was on fire or blown up. On the other hand, a leak of gas was detected by the smell; and it was only a fool who went to look for an escape with a light in his hand.

DECORATIVE WORK.

For decorative work, electricity was admirably adapted—especially when flexible wiring was used. This, however, was not so decided an advantage as it was, owing to the introduction of flexible metallic tubing and the inverted gas-burner with artistic designs for gasaliers and brackets which it had introduced.

APPLICATION TO POWER.

As to power, there was a large field of usefulness for both forms of energy. Each was excellent when used in the right place. Where gas was reasonably cheap, the gas-engine as a prime mover was very good, on account of the small space necessary, the ease in starting, and little attention required during running. The ruling factor, however, was one of cost. When electricity could be generated by a gas-engine generator set on a person's premises, for an inclusive cost of ¾d. per unit and under, with town gas, then the purchase of electricity from an outside concern was obviously a waste of money. Electricity generated in such a way rendered a place less liable to stoppage of work through failure of supply—a thing which often happened with a town supply of current. A modern gas-engine cost 0·3d. per B.H.P. hour for gas alone, with gas at 1s. 8d. per 1000 cubic feet; while electricity, at 1d. a unit, cost 0·75d. per B.H.P. hour, or 2½ times as much as gas at these prices. It was evident, therefore, that at the present prices of current in most places, it was cheaper and more reliable to use a gas-engine as a prime mover. If isolated motors were then required, as in a modern machine shop, it was best to generate the current on the premises with large gas-engines. The modern system in engineering shops of having each large machine or group of machines driven by its own motor, had opened a new field for electricity which it ought to monopolize. In harbour work, for cranes, &c., steel and iron works, metallurgy generally, railway and tramway traction, mines, elevating and conveying work, and the transport of materials generally, ship lighting—such were the true spheres for electricity. In these, the demand was fairly continuous—a most important point with the electrical engineer. But unless current was supplied below ¾d. per unit, it was cheaper, as he had said, to generate one's own electricity by a gas-engine. In concluding, Mr. Robinson said if electric current were charged for in the same understandable way as gas, it would require to be raised in price in the majority of towns. Instead of this, each town seemed to have its own fancy way or method of charging, often below cost price, in order to divert business from the gas undertaking, instead of making it compete on a fair basis. Even with these fancy methods of charging, in 33 towns having a population of 30,000 to 40,000, and each owning its electricity works, twelve made losses, only nine put anything away to the depreciation and reserve fund, and only five contributed to the rate fund. Such a record was not to be found in the gas industry.

THE CASE FOR ELECTRICITY.

Mr. J. G. CUNLIFFE, who followed to support the cause of electricity, at first apologized for not having prepared statistics to place before the meeting in favour of his case, and then made the assertion that the fact of the room in which they were assembled being illuminated by the electric light was proof of its superiority over the old illuminant. Having confessed that he was more interested in the application of electricity than in its making, Mr. Cunliffe went on to give a *résumé* of a conversation he had recently with the Managing-Director of the Temperance Billiard Halls Company—a concern having numerous halls in the North—for which light is required all the day through. This Managing-Director, a keen business man, with an eye to the £ *s. d.* of the question, had been inundated with figures and facts from both sides and tried both illuminants. Having the discussion of that evening in view, he (Mr. Cunliffe) asked this gentleman what his opinion was on the subject; and his reply was to the effect that, in regard to cost, there was practically no difference, and the whole thing was settled by the outlay on lamps. There was no doubt, added Mr. Cunliffe, that the reason electricity was not more favoured for lighting purposes was owing to the failures, and breakages of the filament lamp, which was at present undeveloped; but it was surely reasonable to assume that when its development came—when the filament lamp became almost unbreakable—gas would be altogether out of it. Another drawback was that electricity could not be stored efficiently; and the consequence was very heavy standing charges. On the blackboard, Mr. Cunliffe illustrated the difficulties electrical engineers had in dealing with the "peak" load. He said the method of charging, based on the fact that since storage of electricity was much more wasteful than gas storage electrical equipments had to be built to produce the maximum power required at any time, was also a difficulty. It was due to these complicated tariffs for electricity that it was not in greater use for domestic purposes; but when this had been altered—as it would be shortly—and electricity became reasonably cheap, he anticipated its use would spread much more widely. For some years now electrical engineers had been devoting special attention to the establishment of a standard method of charging the consumer; and when this had once been accomplished, electricity would be more largely used for domestic supply. Then the gas people should recognize that up to quite recently the equipment of electricity stations had been most costly, and that as time went on the cost would be less and the prices fall considerably. In a few years, electricity would be so cheap as to become a more serious rival to gas. As to the dangers arising from electricity, many of the accidents were due to faulty wiring; but before long wiremen would have to be qualified by examination, and hold a certificate of proficiency before being employed. At any rate, there was no danger of their being suffocated in their sleep by electricity; and he might add that, although there were over 200 miles of overhead wires in Manchester, there had only been six wires down in six years. He claimed that the superiority of electricity over gas for traction and power was clearly demonstrated by the plants put down.

Mr. PAGE said it seemed to him there were instances where electricity would be more useful than gas and cases where gas would be preferable to electricity. He did not think the deciding factor was so much that of cost always as usefulness and cleanliness. He questioned Mr. Robinson's figures as to the lighting and cleaning of street-lamps—namely, £1 per lamp per annum.

Mr. ROBINSON replied that this was the actual cost of the work in Manchester.

Mr. PAGE, continuing, said he thought the present price of the osram lamp was 10s. 6d., and not 13s. 6d. as set out by Mr. Robinson.

Mr. ROBINSON replied that he took his price from a catalogue he obtained from the firm a fortnight ago.

Mr. PAGE gave details of two cases where, by the installation of electricity for gas, the occupier of the house had saved—in the first, the cost for the year being £5 7s. 3d., as against an average of £5 11s. 8d. for the previous three years, and in the second £19 0s. 4d., as against £22 7s. 9d.; that being light for light.

Mr. RIDGWAY, from the general tenour of his remarks, evidently favoured the application of electricity for use at large docks, steel works, and for driving cranes. He supplied interesting details of gas-producer plants at different large works, and admitted that for the lighting-up of the sheds and roadways at large docks the incandescent lamp had proved very satisfactory.

THE QUESTION OF MANTLES.

Mr. F. THORP, Vice-President of the Manchester and District Junior Gas Association, twitted Mr. Cunliffe about his remark that because the room was lit by electricity it must be taken that it was better than gas. It was to them, as gas engineers, incomprehensible why a room like that was lit by electricity when it could be better illuminated by gas, and at one-third the cost of electricity. He then went on to say that the question of the cost of mantles was very often remarked upon. During a debate the Junior Gas Association had with the electrical engineers some time ago, he made a statement that he had in his house two mantles which had been in use ten months without breaking. The remark was received with derision. But although two years had elapsed, these two mantles were still there and in use.

The CHAIRMAN: But do they give the same light?

Mr. THORP replied that the light was practically the same. Asked the make of the mantles, he said one was a Welsbach; but he could not at the moment say what was the make of the other. Turning to deal with Mr. Cunliffe's observations about the difficulties electrical engineers had with the "peak" load, Mr. Thorp pointed out that gas engineers were much in the same position, having in the summer months hundreds of thousands of pounds' worth of plant standing doing nothing, because of the lightness of the load compared with the winter months. Then as to the method of charging, those connected with gas undertakings were treated most unfairly compared with their opponents, the electrical undertakings. If the gas people were allowed the same privileges electrical engineers had in this respect, he did not think electricity would have "a ghost of a chance" against gas. He illustrated this point by showing what had been done in Manchester, and humorously remarked that they could do with a little Tariff Reform in this respect. Incidentally, he mentioned that, with the exception of railways, there was more money sunk in gas undertakings in this country than in any other concern. Referring to what had been said by a previous speaker about the usefulness of the flame arc for outside work, Mr. Thorp submitted that they had gas-lamps quite as good, if not better, for the purpose. They had lamps from 10 and 20 candle power up to 3000-candle power, which was sufficient for any purpose. Civil engineers appeared also to favour the use of high-pressure gas

for lighting in preference to electricity. His personal feeling in regard to the flame arc was that it should be made almost a criminal offence to use it. Fixed at street corners, its intense glare was not only injurious to the eyes, but the cause of many accidents.

Mr. BECKETT said he had been interested in the relative advantages of gas and electricity as applied for pumping purposes; and having gone carefully into the matter, he had come to the conclusion that it was best to have the bulk of the work done by electricity, and the smaller portion of the pumping done by gas power. Gas was certainly cheaper per 1000 gallons pumped; but this was not always to be considered in such work.

Mr. D. V. HOLLINGWORTH, F.C.S., a member of the Junior Gas Association Council, dealing with Mr. Page's questioning of the table of costs given by Mr. Robinson, said he would supply the former with what he called "a further horrible example."

Gas.

One 64-c.p. incandescent burner, consuming 4 c. ft. per hour, for 1800 hours = 7200 c. ft., at 2s. 6d. per 1000 . . . . . =	0	18s. 0d.
Renewals, 6 mantles at 4½d. each . . . . . =	0	2 3
	£1	0 3

Electricity.

Two osram lamps, 32 c.p., at 1·3 watts per c.p., for 1800 hours' energy consumed at 149 units at 3d. . =	£1	17 3
Renewals, 6 lamps at 4s. each . . . . . =	1	4 0
	£3	1 3

This proved, said Mr. Hollingworth, that, light for light, and with the prices agreed upon for the purposes of the discussion, the osram lamp—the best electric lamp on the market—was three times more expensive than gas. On the question of the pollution of the atmosphere by gas, Mr. Hollingworth quoted from eminent authorities—such as the members of the "Lancet" Commission, Professor Lewes, Professor Frankland, and Dr. H. H. De Vœux—who had conclusively shown that, neither from an incandescent burner nor from a gas-fire, was there given off any trace of carbon monoxide, acetylene, or, indeed, any deleterious gas whatever. In view of such evidence, he thought it was "high time the vitiation bogey was laid for ever." He considered that in the pollution of the atmosphere the electricians were by far the worst offenders; as by their clumsy methods of burning coal under steam-boilers, 97 per cent. of the sulphur from the coal was disseminated in the air, whereas by the scientific methods used by gas engineers, the great bulk of the sulphur from the coal was retained in the gas-works, to become a source of revenue to the department. Therefore it seemed to him the least said about sulphur pollution the better for the electricians. In regard to flame arc lamps, Mr. Hollingworth wondered if those advocating its use were aware that in the manufacture of these lamps the electrodes were made of hollow tubes of hard carbon, inside which were cores of softer carbon, impregnated with various metallic salts according to the colour of the flames desired. These salts, when strongly heated—as they were in the electric arc—were volatilized, and gave off extremely dangerous fumes of hydrofluoric and hydrochloric acids. Further, he had it upon the authority of a distinguished professor of chemistry that all forms of arc lighting gave off extremely noxious fumes of nitrous oxide and nitric acid. In view of these facts, he thought the advocates of flame and other arc lighting had, on hygienic grounds, an awkward case to answer.

The discussion was continued by Mr. Mellor, Mr. Patterson, and others on the side of electricity; the chief point made being that, with the march of invention, electricity must become an even greater rival to gas than was the case to-day.

GAS PEOPLE HAMPERED.

Mr. Robinson was not afforded the opportunity of replying, owing to the lateness of the hour.

The CHAIRMAN, in closing the discussion, said it must be admitted that, but for the introduction of electricity, we should not have had the rapid advance which had been made in recent years in gas lighting. Personally, he did not like the electric light for domestic purposes, as he could not read by it. He thought for the drawing table and the study incandescent gas was the best. One of the arguments used in the discussion had impressed him very much—that was, the better conditions under which electricity competed with gas in towns where the two undertakings were owned by the local authority. It was evident that the gas people were not fairly treated, and, being the older industry, were hampered by a mass of legislation, and bound as it were hand and foot in every way. If they were free to deal with gas in the same way as with electricity in respect to loads, the position of the gas undertaking would be greatly improved.

This concluded the proceedings.

TESTING SUCTION GAS-PRODUCERS WITH A KÖRTING EJECTOR.

WE have received from Mr. C. M. Garland, of Urbana (Ill.), a print of a paper prepared by him, in association with Mr. A. P. Kratz, assistant in the Mechanical Engineering Laboratory of the University of Illinois, giving an account of the method adopted by them for testing a suction gas producer described in the paper, and used in their tests of gas-producers in the laboratory. The authors say their method reduced to a minimum the labour of carrying out the tests; and the tedium accompanying the making of the calculations was relieved by elaborate forms of computation drawn up by them and appended to the paper.

The tests were made on an Otto suction gas-producer rated at 60 H.P. and 8000 cubic feet of gas per hour. The plant as originally installed consisted of the producer A (fig. 1), the wet scrubber B, the gas-receiver C, and a 22-H.P. engine. In order to facilitate the testing of the plant, the connection to the latter engine was blanked, and a Schutte-Körting steam-ejector of 12,000 cubic feet hourly capacity was placed in the gas-main at F. This ejector was used to draw the gases from the producer, and deliver them to the wet scrubber G, where the steam used by the ejector was condensed.

The condensed steam and condensing water passed out at the overflow M, while the gases issued through the separator N and into the dryer H, constructed from a gas bell or holder, and filled with straw, and used to separate the suspended moisture from the gases before they entered the meters I and J, of 8000 and 3500 cubic feet hourly capacity respectively. These were connected in parallel for capacities greater than the first-named quantity per hour; the larger meter alone being used for lower capacities. From the meters the gases were discharged into the atmosphere above the roof of the laboratory. A gauge-box L was adapted to receive thin plates with orifices, and was used in calibrating the meters by means of air. The meters having been blanked from the gas-main, compressed air was admitted at K, and expanding passed through the meter to be calibrated and let out at the orifice in L. After the calibration, the inlet to the box was blanked. The producer is of the contained vaporizer type, with grate and without charging bell; the specifications stating that it is only to be used twelve hours at a time. During some of the earlier tests, the cast-iron vaporizer was cracked. A steam-jet was then used

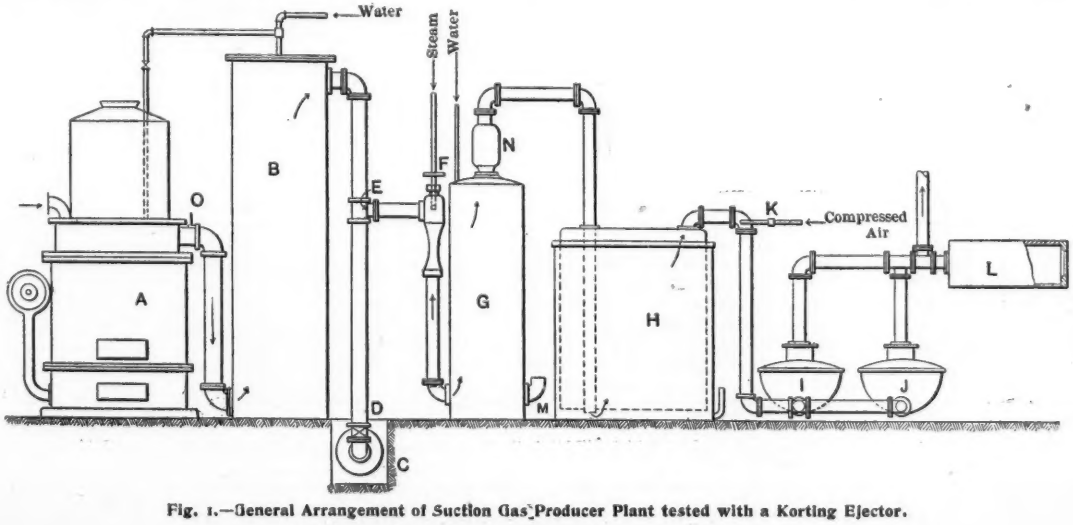


Fig. 1.—General Arrangement of Suction Gas-Producer Plant tested with a Korting Ejector.

to supply the moisture, and the vaporizer was blanked off. The weight of steam was measured by passing the jet through a calibrated orifice in a thin plate.

The test was started with the producer full and with a clean fuel bed. The coal fired during the test was weighed, and at the end of the test the fire was cleaned—the fuel bed being brought to as near the starting condition as possible—and the producer filled. In order that the error in determining the weight of coal fired in this manner might be known, the producer when cold was filled a number of times, and the weight of coal required was noted. The average of these weights was taken to be the true weight of coal required to fill the producer; the probable error in filling with a given weight of coal being estimated from the results. In running, it was endeavoured to make the tests of such duration as to bring the probable error of filling down to 2 or 3 per cent.

The temperature of the gas leaving the producer was taken at O by means of a platinum-rhodium thermo-couple and a Siemens and Halske milivoltmeter, calibrated to read direct in degrees Centigrade. The temperatures in the fuel bed were taken with Hoskins thermo-couples and galvanometer; the latter reading in degrees Fahrenheit. Other temperatures were taken with mercury thermometers. The temperatures in the fuel bed were taken in three horizontal zones, 10, 18, and 24 inches, respectively, above the grate. In each zone, readings were taken 3 inches from the lining on each side, and in the centre of the fuel bed. The results are given in the following table:—

Temperatures in the Fuel Bed.

Time.	Zone No.	Temp. 3 Inches from Near Wall.	Temp. at Centre.	Temp. 3 Inches from Far Wall.
		Deg. Fahr.	Deg. Fahr.	Deg. Fahr.
10.05–10.10 a.m. .	1	2100	2037	2025
10.25–10.30 ,, .	2	2350	2225	2275
10.43–10.55 ,, .	3	..	2200	2400

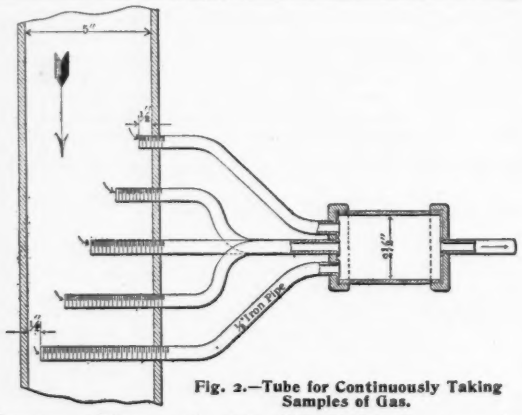


Fig. 2.—Tube for Continuously Taking Samples of Gas.

By means of the sampling-tube illustrated in fig. 2, samples of gas were taken continuously for test by a Junkers calorimeter and for analysis by a Hempel apparatus. The results of the analyses are given in the following table.

Gas Analysis by Volume.

No.	Time.	Per Cent. CO_2	Per Cent. O_2	Per Cent. CO	Per Cent. CH_4	Per Cent. H_2	Per Cent. N_2	B.Th.U.
	A.M.							
1	6.23— 9.05	5·7	0·5	22·9	2·1	12·2	56·6	134
2	9.10—10.37	4·1	0·2	27·9	1·6	11·1	55·1	142
	P.M.							
3	10.39—12.25	3·3	0·1	28·4	1·5	9·5	57·2	137
4	12.30— 2.52	4·3	0·2	26·9	1·8	10·6	56·2	139
5	3.00— 4.35	3·6	0·1	28·6	1·8	9·0	56·9	139
6	4.40— 6.05	4·1	0·3	27·4	1·8	10·0	56·4	138
	Aver. .	4·20	0·23	27·01	1·77	10·40	56·40	138·1

As already stated, the weight of steam fed to the producer was determined by the use of a calibrated orifice. By means of a small laboratory aspirator, a sample of the gas leaving the producer was drawn successively through a calcium chloride tube and a small gas-meter; the weight of moisture being determined by the calcium chloride tube and the volume by the meter. The percentage of moisture determined by this method was used merely as a check; that used in the computations being obtained by calculating the weight of water decomposed from the analysis of the gases and the analysis of the fuel. The difference between this quantity and the total weight of moisture carried into the producer gives the weight of moisture in the gas leaving it.

The volume of gas generated by the producer, and measured by the meters, was also checked by computing the volume of the gas generated from the analyses of gas and coal. In the anthracite producer, where the loss of carbon in soot and tar is small (probably not more than 1 per cent.), this offers an excellent means of checking the volume of gas, and also of computing the weight of air used. Gas analysis—where continuous samples are taken by the form of sampling-tube illustrated—should be accurate within 1 per cent. The greatest error is likely to be made in the sampling of the coal. With a fine coal, such as pea or buckwheat, and a sample representing from 10 to 20 per cent. of the total weight of coal fired, the error in sampling should not exceed 2 per cent. The maximum error in determining the volume of gas and weight of air used should not exceed 5 per cent., if the error in filling the producer is 2 per cent. The probable error is therefore much less. In most of the tests, the volume of gas computed from analysis has checked within 5 per cent. the volume determined by the meters. The meters are known to be accurate well within 2 per cent.

In the testing of large producers of the bituminous type, it is often difficult to measure the volume of gas by any mechanical means. In such cases, if the carbon lost in the soot and tar is estimated from a sample of the soot and tar, and this amount is deducted from the total weight of carbon in the coal, the volume may be computed from the analyses of the gas and coal, and may be relied upon within 5 per cent., provided the sampling is correct. The graphical log-sheet (fig. 3) illustrates the uniformity of the conditions that were maintained throughout the test.

As already mentioned, the authors prepared forms to facilitate the computations; and they are appended to the paper. There

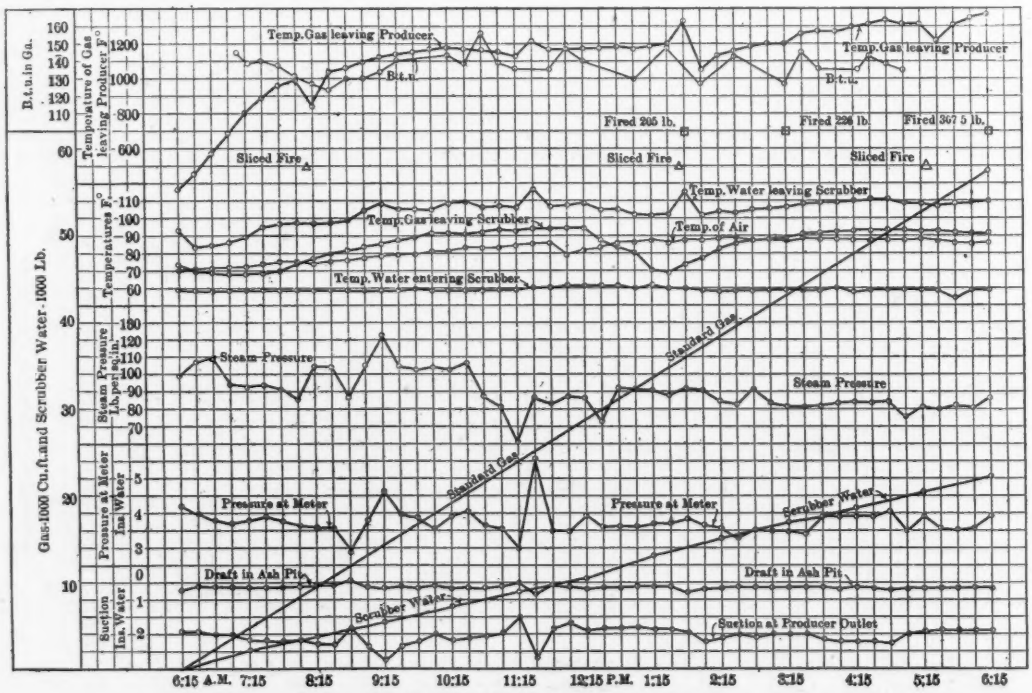

B.t.u. in Gas.
Temperature of Gas leaving Producer F°
Temperatures F°
Steam Pressure Lb. per sq. in.
Pressure at Meter Ins. Water
Suction Ins. Water
Gas-1000 Cu. ft. and Scrubber Water-1000 Lb.
Temp. Gas leaving Producer
B.t.u.
Fired 205 lb.
Fired 226 lb.
Fired 367 5 lb.
Sliced Fire
Temp. Water leaving Scrubber
Temp. Gas leaving Scrubber
Temp. of Air
Temp. Water entering Scrubber
Steam Pressure
Standard Gas
Pressure at Meter
Scrubber Water
Draft in Ash Pit
Suction at Producer Outlet
6:15 A.M. 7:15 8:15 9:15 10:15 11:15 12:15 P.M. 1:15 2:15 3:15 4:15 5:15 6:15

Fig. 3.—Graphic Log of Test of Suction Gas Producer.

are two and a guide-sheet. Form No. 1 is used only for the presentation of the results of the tests; No. 2 contains all the items used in the computations; while the guide-sheet contains all the formulæ and their derivation. In following out the authors' method, the average corrected quantities are taken from the original data sheets and put on form No. 2; and the computations are made by following the guide-sheet. After No. 2 is completed, the results are transferred to No. 1.

REGISTER OF PATENTS.

Discharging-Chargers for Gas-Retorts.

ALDRIDGE, J. G. W., of Victoria Street, Westminster, S.W.

No. 26,056; Dec. 2, 1908.

This invention relates to discharging-chargers for gas-retorts, as described in patent No. 10,480 of 1902 and No. 5375 of 1906. It has for its object "to prevent waste of coal and ensure even charges in the retorts." A further object is to facilitate the repair of the discharging-charger chain.

The arrangement protected consists of a sliding apron plate adjustable between the end of the machine and the mouth of the retort; shield plates hinged at the lower part of the coal-shoot, and pressing against the sides of the chain, so as to prevent the coal escaping over the sides of the chain when the chain is being charged; an automatic sliding plate, placed in front of the shoot, also for preventing the escape of coal; hinged devices for keeping at a definite level the hinged push-plates that push the charge along the retort bottom, so that the coal is levelled on the return stroke; and adjustable and renewable wearing strips on the bottom of the chain, "so that the chain shall be kept in good working order for a considerable period without any renewal of the main parts being necessary."

Referring to figs. 1, 2, and 3, the bed-plate A of the machine is supported on rollers B; and the front or retort section is hinged to the bed-plate so as to swing vertically. It is carried on rollers journalled at the ends of pivoted levers C, whose other ends have counterbalancing weights sufficiently heavy to ensure that the pivoted apron-plate section shall incline upwards, while the whole of the bed-plate is run forward by a hand or power operated pinion D working in a rack on its underside. A stop T on the apron-plate comes against the bottom edge of the retort mouthpiece to prevent its going too far.

In the arrangement shown, the apron-plate is operated or adjusted by a hand wheel E provided with a ratchet wheel and pawl held in engagement by a weighted lever F, which prevents the apron-plate from moving back accidentally from the retort mouthpiece, and is released by a pedal when it is desired to withdraw the apron-plate.

The levers carrying the weights have slots whose sides engage with stops in the form of nuts G on a threaded rod, so that the line of movement can be altered. These stops prevent excessive movement of the apron-plate either upwards or downwards.

When the chain passes on to the apron-plate, its outer end is pressed down on to the floor of the mouthpiece, "so that all inequalities of setting of the retorts are provided for (in the direction of the retort) by the longitudinal movement of the bed-plate and vertically by the rise of the end of the apron-plate."

The coal-shoot I (fig. 4), which is of the same cross section as the top of the chain, is fixed at its lower end to the bed-plate frame by plates and extended towards the rear to facilitate rapid delivery of coal. In the interior of the shoot are mounted longitudinal hanging flaps J, whose lower edges can be regulated by adjusting screws, to vary the distance between them, and so regulate the amount of coal passing into the chain. In order to prevent coal falling over the sides of the passing chain, external hanging flaps K, pressed inwards by springs and provided with wearing strips, bear against similar wearing strips on the upper edges of the side plates L of the chain; and to prevent the escape of coal at the forward end of the shoot, a vertical plate M is arranged in the front of the shoot, with the bottom edge curved to arch shape. In order to clear the saddle-bars on the chain as it passes, the plate is arranged to slide vertically in guides, and two double inclined planes are fixed to its lower edge, which slide over the saddle-bars, so that the plate is lifted automatically on meeting a saddle-bar.

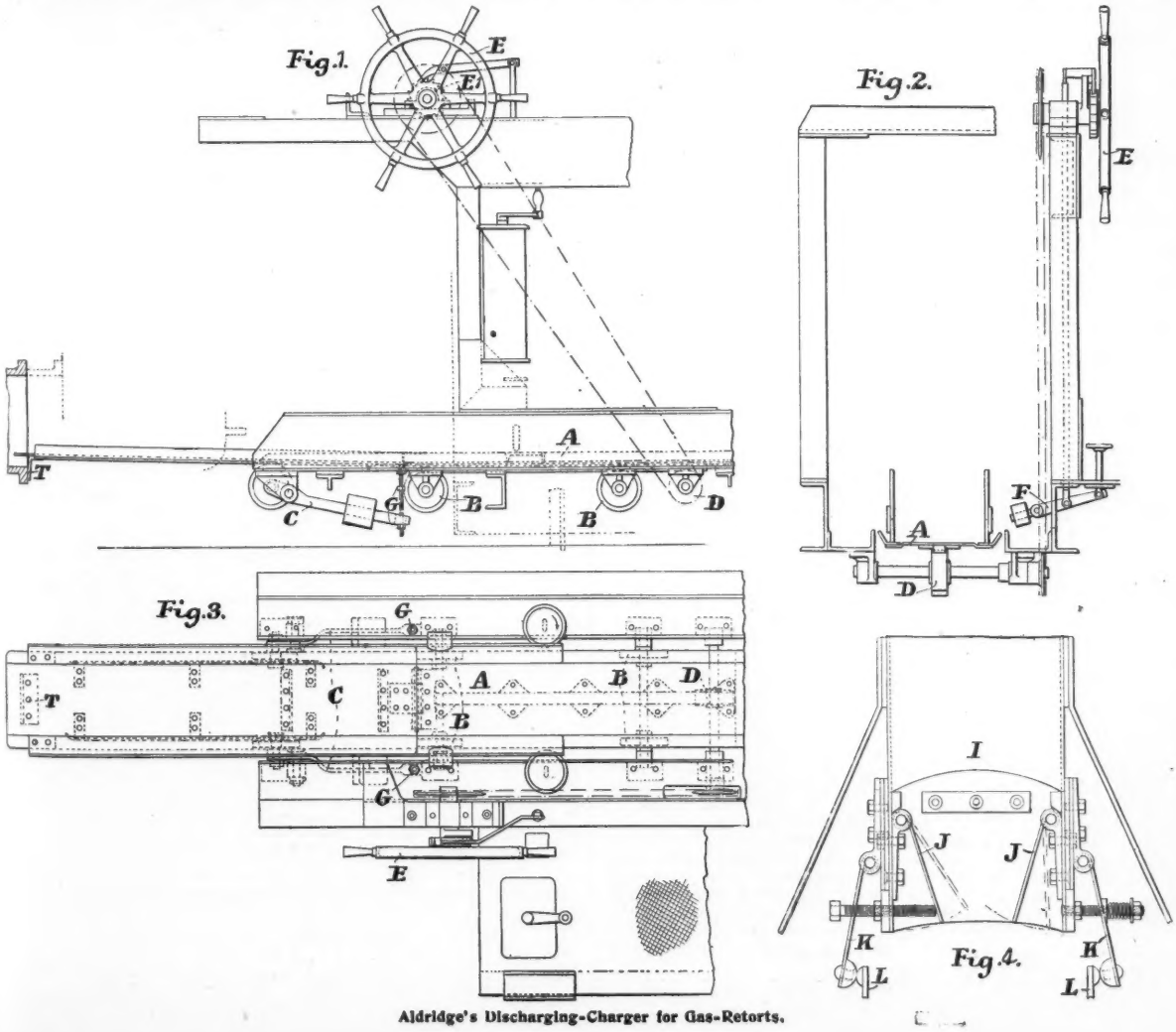
Suction Gas-Producer.

FARNHAM, R. V., of Wemyss Bay, N.B.

No. 26,199; Dec. 4, 1908. No. 11,675; May 18, 1909.

This combined patent relates to generators or gas-producers of the kind wherein the fuel is fed at each fresh charge direct on to a vertically movable support, co-operating with a temporary horizontally movable support so that the gases arising from the fresh charge are caused to pass through the incandescent fuel resting above the fresh charges, and the volatile matters and hydrocarbons are resolved into fixed gases.

The novelty of the invention consists in the particular construction of generator employed. It comprises a central combustion chamber of fire-brick located within a metal casing provided with means for effecting the destructive distillation of the coal; the combustion chamber having the fire-grate at its lower end, and its upper end being contracted and surmounted with a hopper, through which is fed the fuel. The



Aldridge's Discharging-Charger for Gas-Retorts.

fire-grate is capable of being raised vertically to carry with it the incandescent fuel or compress the fuel in a space above the grate; and for this purpose devices for lifting the grate are operated from outside the generator casing. In conjunction with the grate there is provided, at about the height to which it is intended to be raised, a channel-shaped guide, in which a perforated metal plate is arranged to be slid horizontally, so as to pass through the incandescent fuel after the grate has been raised, and to support all the fuel in the combustion chamber temporarily after the grate is lowered. When the grate is lowered, the space left between the supporting plate and the fire-grate (after the fire-grate has been cleaned by a cleat to prevent the formation of clinker) is fed with fresh fuel through a lateral opening just above the grate, and which fuel may be fed forward by a screw conveyor or the like. When the supporting plate is withdrawn, the fresh fuel is quickly ignited by the incandescent fuel now dropped upon it, and the volatile matters arising from it are resolved into fixed gases in passing through the incandescent fuel.

Timing Device for Gas-Controllers.

HORSTMANN, A., G. O. H., E. H., & S. A., and EDGAR, W. T., of Bath.

No. 32; Jan. 1, 1909.

This invention relates to clockwork gas-controllers and time switches fitted with cam equation mechanism for varying the position of the points of discharge in relation to a time dial. It further relates to the kind of mechanism which rotates on an axis—particularly to the arrangement of the cams whereby they are rigidly mounted on one common spindle capable of being altered in relation to the gear-work which rotates them.

The following advantages are said to be obtained: As both cams are fixed in relation to each other in accordance with a predetermined time chart (such as the schedule of the times of lighting and extinguishing), the date to which they both relate is recorded on a dial plate or index, and can be altered at will. As both cams are rigidly fixed in relation to each other, inaccuracies due to back-lash (which occur where individual spindles are used for each cam) are eliminated. As the combined cams are made to actuate their attendant discs, cams of a greater eccentricity may be used than is possible where cams are mounted on individual spindles. As both cams are rigidly fixed in relation to each other, the mechanism itself may be used to record time in its annular rotation.

In the specification of patent No. 27,849 of 1904, there was described mechanism revolving on its own axis and carrying discharging pins whose angular position in relation to the axis was varied automatically by means of two cams mounted on separate axes to which were imparted regular motion by means of a worm; and the main object of the present invention is to avoid certain inconveniences associated with the use of the arrangement formerly patented, without increasing the size of the whole mechanism.

Thermo-Electric Pyrometers.

PEAKE, W. S., and the CAMBRIDGE SCIENTIFIC INSTRUMENT COMPANY, LIMITED, of Cambridge.

No. 370; Jan. 7, 1909.

This invention relates to thermo-electric pyrometers in which a thermo-couple of (say) platinum and an alloy of platinum is connected by base metal leads to an indicating or recording instrument at some distance from the thermo-couple itself; the object being to increase the accuracy of the readings obtained, and to render unnecessary any device for maintaining the junction between the leads and the thermo-couple at a constant temperature, by causing the readings to be independent of the temperature of the end of the thermo-couple to which the leads are connected.

One feature of the invention consists in the employment of leads composed of dissimilar metals or alloys, such that their thermo-electromotive force, when in direct contact, is equal to that of the thermo-couple for the same temperature difference. This need only apply within the range of temperature met with at the "cold" end of the thermo-couple. A further feature consists in the employment of leads each of which is composed partly of a metal or alloy dissimilar to that of a corresponding part of the other, the other portions of both leads being composed of the same metal or alloy.

Disc Valves.

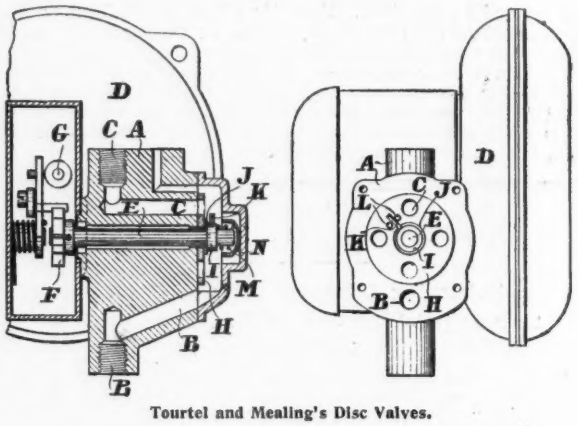
TOURTEL, J. M., of Chiswell Street, E.C., and MEALING, W. R., of Twickenham, S.W.

No. 1072; Jan. 15, 1909.

These disc valves are particularly designed for use with gas apparatus of the kind in which the lighting and extinguishing are effected by increasing the pressure in the mains; but it is also applicable to apparatus where a valve is required which is easily turned and is used for the opening and closing one or more passages.

The disc valve used for controlling the supply of gas is placed within a supply chamber, and is furnished with an operating rod which passes from the chamber and freely through the valve to outside the chamber. The rod is provided at the end which projects through the chamber with means for turning it (such as a ratchet-wheel) and bearing within the chamber a collar or enlargement, between which collar or enlargement and the face of the valve is placed an elastic washer, which is compressed by a spring tending to force the rod outwards—thus securing a gas or water tight joint. The rod also bears within the chamber a projection, which engages with corresponding projections or the like upon the valve so as to form a connection for the purpose of enabling the rod to turn the valve.

The part A has formed in it the gas inlet B and outlet C, which are opened to each other or closed by the movements of the disc H, which



Tourtel and Mealing's Disc Valves.

has four equidistant holes. The disc is placed over the spindle E, which is furnished with a shoulder I carrying a pin K, which, by fitting between two pins L on the disc, conveys all rotary motion of the spindle to the disc. A spring M, fitted under the anti-friction cap N, presses against the collar, and causes it, through the medium of the elastic ring J, to hold the disc in close (but easily movable) contact with its face on the piece or block A. The cap is held in place by a cover which forms one side of the gas-passage.

The spindle is connected to the ratchet mechanism F controlled by the rod G, which is moved by a diaphragm (not shown) in the case D. The arrangement allows a certain amount of flexibility between the spindle E and the disc H, and yet ensures a gas-tight joint for both. It also allows for any slight irregularity in fitting, whereby the spindle might not be exactly at right angles to the face of the valve. This would not be possible if the spindle and the disc were solidly connected together or made in one piece.

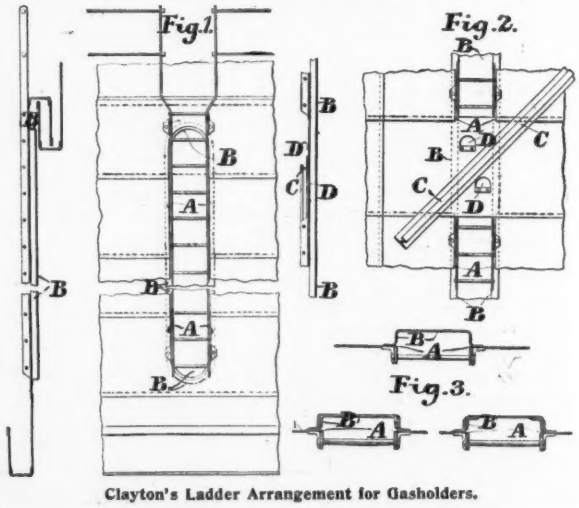
Ladders for Gasholders.

CLAYTON, L., and CLAYTON, SON, AND CO., LIMITED, of Leeds.

No. 8913; April 15, 1909.

The patentees commence their specification by saying: The usual practice in ascending and descending spirally-guided gasholders, and also what are termed the "flying" lifts of ordinary gasholders, is by an iron ladder fixed to the outside of the shells; but as the spaces between the shells are limited, the ladder is obliged to be fixed close to the sheets, and thus the limited foothold provided (due to the staves of the ladder being a very short distance from the face of the gasholder) renders the operation of ascending and descending very dangerous. The object of the invention is to construct holders in such a manner at the part where the ordinary iron ladder is situated as to make room for the foot, and thus obviate the danger referred to.

With spirally-guided holders, a recess is formed in each of the various lifts of a depth and width to suit the ladder, and consisting of a vertical opening left in the plates and filled in behind by a trough (of similar depth and width to that of the opening) riveted to the side sheets of the holder. Opposite the recess thus provided is fixed a ladder, secured to the side of the holder by angle ears or otherwise. At the part where the spiral guide crosses the recess, the side sheets may be continued across the opening, in order that the guide may be riveted to them, and so retain its support; holes being provided in the plates for the foot so as to form a continuation of the ladder.



Clayton's Ladder Arrangement for Gasholders.

Fig. 1 is a front elevation and sectional side elevation of the lifts of a holder at the part where the spiral guide does not cross the ladder, provided with a ladder recess according to this invention. Fig. 2 shows a portion of one of the lifts of a gasholder at the part where the spiral guide crosses the ladder. Fig. 3 shows sectional plans of various ways of making the ladder recess.

In fig. 1, the sheets of the gasholder are cut away so as to form a

vertical opening A, which is filled in behind by a trough B, of similar depth and width to the opening. In fig. 2, the side sheets above and below the central side sheet are similarly cut away so as to form a vertical opening filled in behind by a trough. The central side sheet is continued across the recess formed by the trough in order to receive the spiral guide C, which may be riveted to it and so retain its support. The ladder in this example is made in two parts attached by angle ears to the face of the gasholder in front of the recess formed by the trough, while the central side sheet is formed with holes D for the foot, so as to form a continuation of the ladder.

The trough may be formed out of a single plate as shown in fig. 3, or it may consist of angle-bars and a channel plate, or of Z angle-bars and a flat plate.

Discharging and Conveying Coke from Coke-Ovens.

SCHNIEWIND, F. W. C., of New York.

No. 10,483; May 3, 1909.

This invention relates to apparatus for discharging and conveying coke from coking-chambers or like structures—the coke so discharged being conveyed, generally, to a receiving station, where it is discharged into cars for railway transportation or into other storing devices.

One object of the invention is to provide apparatus so arranged that the coke from each retort can be transferred to a coke-receiver without undue jarring and in a gradual manner, "so that the coke will neither jam in the retort being emptied nor be broken up—thus avoiding injury to the oven walls and undue crumbling of the coke, with a consequent material reduction in the amount of coke breeze or waste coke dust formed." Another object of the invention is the provision of means by which the coke may be covered during the discharging operation and during transportation to the discharge station by a movable cover or lid. The apparatus is particularly designed for discharging coke-ovens in which the ovens proper are emptied through their lower ends.

Sixteen claims form part of the specification, which extends to five printed pages, and is illustrated by three sheets of detail drawings.

Clockwork Devices for Lighting and Extinguishing Gas-Burners.

SPARKS, E., of Tufnell Park, N.

No. 19,941; Aug. 31, 1909.

This invention relates to improvements in patent No. 11,751 of 1902, where was described a gas-cock operated by clockwork through a weighted lever, which, when raised by the clockwork, was moved from one to the other of its two oppositely inclined positions, and thus opened or closed the cock. It also proposed to rotate (to open or close) a gas-cock by clockwork through a weighted lever, which, when raised and released, fell always in the same direction, and in its fall rotated, by means of a pawl mounted on a bell-crank lever, a ratchet-toothed wheel secured to a gas-cock.

The present invention has reference to a particular construction and form of one-way weighted lever for this purpose, and to a preferred form of cock for use with such lever. The weighted lever which is pivoted axially of the gas-cock is provided with a shield, adjustable as to position and adapted to be engaged by the usual tappet of the control disc; and this lever, when raised by the contact of the moving tappet with the shield, and allowed to fall, rotates the ratchet-wheel to the extent of one tooth by means of a pawl pivoted on the lever. The cock, to the stem of which the ratchet-wheel is fitted, is preferably of the types described in patent No. 8690 of 1908 or No. 2630 of 1909.

Rochdale Corporation and Vertical Retorts.—Last Thursday, a Sub-Committee of the Gas Committee of the Rochdale Corporation, accompanied by Mr. T. Banbury Ball, the Engineer, paid a visit to the St. Helens Gas-Works, and inspected the Glover-West vertical retorts in operation there. It may be remembered that in December last the Rochdale Town Council approved of plans for extensions and alterations at the gas-works, to cost some £25,000; one of the proposals being to rebuild the old retort-house, and instal vertical retorts in the new structure. The Sub-Committee are also to inspect the Woodall-Duckham retorts before reporting to the full Committee.

Use of Water by City Departments in Boston (U.S.A.).—The use of water by city departments was the subject of a report some time ago by Messrs. Metcalf and Eddy to the Boston Finance Commission. According to an abstract in "Engineering Record," it has been the practice since 1900 in Boston to furnish water free of charge to the various municipal departments, with the result that extravagance and waste were observed to exist. In many of the school houses water was allowed to run continuously through the fittings, not only in school hours, but also during nights, holidays, and possibly vacations. In an investigation of the records of water consumption by 35 schools in 1905, it was found that only eight, or 23 per cent., showed a consumption of less than 5 gallons per pupil per day; eleven schools used or wasted more than 20 gallons; four more than 40 gallons; and one more than 100 gallons per day per pupil. The reporters believe that the loss of revenue to the Water Department of Boston resulting from furnishing free water to other city departments during 1908 probably exceeded $320,000. The consumption of water per head in Boston during 1907 was 157 gallons per day; and Messrs. Metcalf and Eddy believe that not less than 60 gallons of this amount is waste. They suggest as a remedy for checking the excessive waste the use of the Deacon system, which is already installed, but not used, according to the Water Department, because of lack of available funds. They recommend that the former custom of charging city departments at regular rates for water used by them be re-established, and that hydrant rentals be fixed at not less than $15 per hydrant. It is stated that the Water Department, by furnishing free water to other departments, loses annually a sum equivalent to about 10 per cent. of its gross income.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Preparation of Tar for Road-Making.

SIR,—I often read with interest your reports of meetings of our various British Junior Gas Associations, at some of which meetings papers of very considerable interest are given, which show an amount of ability in their preparation and discussion which is very gratifying to anyone who is concerned about maintaining the quality of our gas-works official staffs. Some of the work reported in your issue of Jan. 18 is of this good quality; but at the meeting of the Scottish Junior Gas Association the paper given by Mr. Butter, of the Perth Gas-Works staff, calls for some different criticisms than it received at the meeting. I hope it may not be considered ungracious for a senior to offer these criticisms; my only anxiety being to prevent the making of mistakes in the early days of the use of prepared coal-gas tar for the making and preserving of roads.

I desire at once to offer a word of warning, and to say that the preparation of refined tar is not likely to be the simple and smooth running process Mr. Butter seems to suggest.

Mr. Butter, I suppose, was speaking from his knowledge of tar as he finds it in Perth. Therefore, his conclusions, so far as one can arrive at any by a perusal of his paper, must not be taken as applying to tar produced in the British Isles generally.

Mr. Butter speaks of certain tar compos as being "preferable" for road-preservation purposes, because these are prepared from tars from which all deleterious constituents have been removed. Now as the removal of these constituents requires complete distillation of the tar to be used, Mr. Butter's description of apparatus suitable for the preparation of refined tar (viz., an old boiler-shell, &c.) may be very misleading to anyone who imagines that by any such incomplete apparatus properly refined coal tar can be prepared, suitable for road making, either by pressure spraying or any other method—even by the wonderful tar-spraying machine of which Mr. Butter advocates the use after removing "all loose binding and extraneous matter" from the roads.

To advocate the erection of such plant to prepare tar for such a purpose seems to me quite a contradiction of the arguments which favour the use of refined tar freed as far as possible of all deleterious constituents, and having added to it certain other constituents of a nature helpful in the required direction.

Moreover, the instructions contained in the paper are contradictory. In the instructions as to the use of an old boiler for the preparation of refined tar, it is stated that, after the water and naphtha are removed, the tar is ready for use. And then for certain purposes it is recommended that part of the "oil" be returned (but there is no explanation as to which oil is referred to), and the naphtha obtained is sent to an ever-ready market.

The incompleteness of the description of the Perth plant and its working to enable it to turn out pitch and oils or refined tar according to demand, are evident to anyone who understands the subject. But how the finished road-surface on the Carse of Gowrie can be "caused by vaporizing the tar and forcing the vapour into the road at the high pressure mentioned, leaving no deposit whatever on the surface," passes my comprehension. And as I look in vain at the discussion and reply for any light on the subject, I would warn intending experimenters that they are likely to fail if they try to preserve roads with refined tar prepared in accordance with such instructions, and applied after that fashion; and the development of tarred roads in the district where such experiments are tried is likely to be very slow, however reasonable a figure the tar was supplied at.

St. Helens, Jan. 28, 1910. SAMUEL GLOVER.

Gas-Service Pipes to Lamps.

SIR,—In reply to "Secretary's" letter relative to above, I think the usual practice is for the service from the main to the bottom of the lamp-pillar to be paid for by the gas supplier. The rising pipe in the lamp—that is, the pillar pipe—is usually supplied by the lighting authority.

Jan. 27, 1910. INSPECTOR OF LIGHTING.

SIR,—Our practice is to lay 30 feet, voluntarily and (without prejudice) free of charge. If the service is more than 30 feet long, the council pay towards the cost; but the service remains the property of the gas company.

But what is the position in the following circumstances? The council own the lamps, columns, and lighting appliances. The existing gas-lamps within 10 feet of the mains are converted to electric lamps; and the council require a supply of gas to one lamp 70 feet from the gas-main.

These circumstances were not anticipated; and there is no provision for our guidance. Should the council pay the whole of the cost; and then would the service remain the property of the gas company?

Jan. 27, 1910. MANAGER.

Dessau Vertical Retorts at Sunderland.

SIR,—Mr. Dru Drury's corrected figures of results in this week's "JOURNAL" are, indeed, both creditable and interesting.

As one who may lay claim to a large amount of work and experiences in the carbonization of coal in vertical retorts of various designs, I can give appreciative welcome to the results obtained at Sunderland, both by steaming and non-steaming the charge. I, however, lost all my love for steaming because it so seriously broke down the healthiest part of the best conditions—*i.e.*, illuminating power; and it had beside other disadvantages.

Referring to the "JOURNAL" for the 18th inst., I find you say (p. 147): "In fact, those interested [I am one] in the system see no reason—using coal of the quality of that employed at Sunderland—why a

production should not be realized of considerably over 14,000 feet of 14·5 candle gas." I have written it before, and again repeat, that in October, 1903, 14,300 cubic feet of over 14·5-candle gas was obtained at Exeter, using steam. I am deeply list in the Sunderland results, as between steaming and non-steaming. The increase in volume and loss in illuminating power, practically run tandem—viz., 3·5 per cent. and 4·5 per cent. (approximately) over and under non-steaming and steaming conditions. A very rare experience I venture to think!

It would be interesting to know if the plant used at Sunderland—after (say) the foul main—is apparatus that has been used before? I mention this, only because, at Exeter, with a fourth vertical retort, erected in a new position, we used the old coal and cannel testing plant from the hydraulic main to the gasholder. With heats up, and carbonization in fair go, we resorted to steaming the charge, and were very much puzzled to find a rapid rise in the illuminating power, despite the fact the steaming was a dragging-down process, with expectations of seeing a marked reduction in the illuminating power.

Investigation proved—in plain language—we were driving a hungry pack of hounds through a butcher's shop.

Dartmoor, Jan. 28, 1910. T. SETTLE.

Lectures to Juniors—A Suggestion.

SIR,—During recent years, the heads of the great gas companies have given considerable attention to the technical training of their employees; and many are the advantages offered to those who have the prescience to take heed of the efforts of "the powers that be." Still I think that a point is missed. Nothing is done to interest in the practical production of gas those juniors who are not employed at the works. I think that the lectures now given would prove of greater advantage to ambitious juniors if they could be given opportunities to see gas in the making, and also be initiated in what to them are the mysteries of the bye-products.

Would it be too much to ask for a series of peripatetic lectures at Beckton, on Saturday afternoons, open to juniors in all departments?

London, Jan. 24, 1910. O. B.

Suggested Conferences of Gas and Water Companies' Secretaries.—A correspondent, a Fellow of the Institute of Chartered Secretaries, writes: "Is it not possible for secretaries of gas and water companies to meet and discuss topics of vital interest to our profession in the same way as our engineer colleagues? I throw out the hint in the hope that some one from our leading companies may take the initiative; and doubtless many, like myself, will be glad to associate themselves with the movement."

Repairing Leaky Gasholder Plates.—A correspondent asks: What is the best thing to do with a gasholder when the bottom plate begins to get perforated? He says four or five holes have rusted through his holder about 4 and 5 inches from the angle iron at the bottom. He wishes to know how best to stop these holes. The holder is 40 feet diameter, 12 feet high, and weighs slightly over seven tons. He adds: The holder could easily be dispensed with for at least three months during the summer, as there are two other holders of the same size on the works.

Buenos Ayres (New) Gas Company.—A meeting of the Buenos Ayres (New) Gas Company was held on Monday last week, at the offices of the Company, to determine whether an application should be made to the Court for the appointment of any person in the place of, or jointly with, Messrs. Frederick C. im Thurn and Ross Pinsent, the Liquidators appointed by the Company, or for the appointment of a Committee of Inspection. The Chairman (Mr. F. C. im Thurn) said that proxies representing £134,900 in debenture stock and £283,000 in share capital had been received. There was no opposition to the gentlemen named.

Walker and Wallsend Union Gas Company.—At the annual meeting of the Company on the 11th inst., the Directors will report that, notwithstanding that the continued general depression in trade caused a further decrease in the consumption of gas last year, the revenue account is satisfactory; the gross profits being more than sufficient to meet all the necessary appropriations, and pay the maximum dividends authorized in accordance with the sliding-scale. Manufacture was discontinued at the old Walker works in April last; and since then gas production has been carried on entirely at the new ones. The Directors state that their anticipations as to the savings accruing thereby have been fully realized. The profit for the year was £11,924; and the balance carried forward was £5208—making a total of £17,132. After payment of the interest on mortgages, &c., the dividend on the preference stock, and the proposed dividends on the ordinary 10 and 7 per cent. stocks (at the rates of 12 and 9 per cent. per annum respectively), there will be left a balance of £5289 to be carried forward. The quantity of gas sold for private consumption last year was 223,188,000 cubic feet.

Suggested Use of Discs in Prepayment Meters.—In the course of a letter to the "Manchester Guardian," on the subject of prepayment meters, Mr. J. D. Affleck says: "The sooner current coin ceases to be used in these meters, the better it will be, as the very fact that the meter contains money is a great temptation to the young, as well as to a band of thieves known to the police as 'the slot thieves.' To overcome this pilfering evil, I would suggest that discs be used instead of pennies—shopkeepers to be appointed agents for these discs by the Manchester Corporation on the same lines as branch post offices. Agents would buy direct from the Corporation, and payment would be made at the time of purchase—a small commission being paid to such agents. Then a housewife, making her weekly purchases, could at the same time obtain as many discs as she required, and could leave them about her house without risk of temptation to the young people, as the discs would only be good for use in the meter—each having the Corporation number and crest printed on. Anyone trafficking in these goods without a licence would be liable to prosecution. The collections need then be made less frequently."

LEGAL INTELLIGENCE.

TICEHURST GAS COMPANY'S AFFAIRS IN COURT.

At the Dewsbury County Court, last Friday, His Honour Judge GENT held a special sitting to hear a claim made by Messrs. Firth Blakeley, Sons, and Co., Limited, Engineers, of Thornhill, Dewsbury, against Mr. Albert W. Lunt, described as an Architect, of Heathfield, Sussex, for £43 13s. 2d. for a gas purifier and fittings. The defendant brought in a third party—Messrs. Edward O. Preston and Co., of Tokenhouse Buildings, London, E.C.

Mr. T. P. PERKS appeared for the plaintiffs; Mr. HAROLD NEWELL, for Mr. Lunt; and Mr. BARNES, for Messrs. Preston and Co.

Mr. PERKS, at the outset, announced that Mr. Newell consented to judgment for the amount claimed, and would pursue his remedy against the third parties.

Mr. NEWELL said Mr. Lunt was Managing-Director of the Ticehurst and District Water and Gas Company. Mr. Preston was a financier, and a very rich man; and the dealings of the Company were really controlled by him. In July last, a purifier was needed; and Mr. Lunt consulted his principal, Mr. Preston, who told him to get some estimates out. Mr. Preston was really the Financial Manager of the Water and Gas Company; and he received the moneys, and found money for it. When Mr. Lunt had got out the estimates, he went to Mr. Preston's premises in London; and Mr. Preston instructed him to see his (Mr. Preston's) confidential clerk, Mr. Brown, in another room, and get him to order the purifier by telephone. He went, and Mr. Brown ordered the purifier by telephone. Mr. Newell handed up to his Honour a document in pencil written by Mr. Brown, referring to the conversation upon the telephone, and also a letter written there and forwarded to Messrs. Firth Blakeley. The price of the purifier was £26. Mr. Lunt simply acted as Mr. Preston's agent.

Mr. *Lunt* bore out this statement. He said Mr. Preston was a financier and company promoter; and he was really the controller of the Company named.

Mr. BARNES: You are a Director of this Gas and Water Company, are you not?

Witness: Yes.

Who had the control of the Company?—I was the Manager.

The Company for some considerable time has been in low water?—Yes.

It has been necessary to obtain advances in order to keep things going?—Yes.

When the Company were in low water, they approached Mr. Preston, did they not, to make advances?—I do not know anything about that. I know Mr. Preston came into the concern again when it got into low water.

His HONOUR: Came in again?

Witness: Yes; he was the original promoter. The undertaking got into other hands, and he took it over again.

The purifier was to be paid for out of the rentals?—It was to be.

Mr. BARNES: Those were received by the Gas Company.

Mr. NEWELL: Received by Mr. Preston.

Witness: Mr. Preston had the control of all the moneys.

His HONOUR: He received the gas and water rentals?

Witness: He received every penny. Mr. Preston said he was to arrange terms of payment, if he could; and he also assured him (witness) that he would personally guarantee payment, if the Company could not.

Mr. NEWELL: Who paid your wages?

Witness: Mr. Preston.

By his own personal cheque?—Yes. The Directors gave no order for the purifier.

Mr. BARNES, who had no evidence to call, submitted that the plaintiffs had not made out a case. Mr. Preston was in the position of mortgagee; and the Company knew, and Mr. Lunt knew, that they could not have got the purifier from Messrs. Firth Blakeley without first approaching Mr. Preston.

His HONOUR said Mr. Preston was in a position analogous to a mortgagee, who was carrying on a business over the heads of the Directors. They consented to his management and control, and abstained from ordering the purifier; but they either sent or allowed Mr. Lunt to go to Mr. Preston to see whether he would give the order for it or not. He thought that the defendant was justified in concluding that, when he ordered the purifier, he did so as the servant of Mr. Preston. He would therefore give judgment against the third party, Messrs. Preston and Co., for the debt and costs.

RIGHT TO OPEN STREETS IN NEW YORK.

There has lately been given by the Appellate Division of the Supreme Court in New York a decision in an action brought by the Municipality against the New York Mutual Gaslight Company on the question of the right to open and occupy streets for gas-mains. The full text of the judgment, which was the unanimous one of five Judges, has just been given in "Progressive Age," from which the following particulars have been taken.

The complainants alleged that by an Act passed in 1866, whereby the Company were authorized to manufacture and sell gas, provision was made that no public street or highway in the city should be "dug into, injured, or defaced," without the permission of the municipal authority having the supervision of such street. This permission, however, might be dispensed with if the majority of the owners of the property immediately adjoining should give their consent in writing to the work being done. Two years later, the Board of Aldermen gave the Company the necessary authority, for a period of thirty years, to lay their pipes in the streets, subject to similar restrictions as those applying to the New York and Manhattan Gas Companies. On the

strength of this permission, the Company opened the streets and laid down their mains, without, it was said, first obtaining the consent of the majority of the parties interested in the adjoining property. It was submitted by the plaintiffs that the right of the defendants to open the streets expired on April 30, 1898, and that since then they had opened the streets and laid mains without any legal authority to do so, and had consequently been guilty of a trespass. Application was made for an injunction to restrain them from making further excavations, and to compel them to remove their pipes with all convenient speed; or, in the alternative, to obtain from the plaintiffs a new franchise. The Court were asked to direct that an account should be taken of the amount of damage the plaintiffs had sustained by reason of the alleged unlawful occupation of the streets by the defendants.

For the defence, it was stated that the Company had carried on their business for a period of nearly forty years without objection from the plaintiffs or the public, but, on the contrary, with the express consent of the consumers and property owners and the duly constituted authorities in the City and State of New York. The defendants further alleged that they had, in accordance with the law of 1866, obtained the consents of the majority of the owners of the property immediately adjoining the parts of all streets and highways in the city dug into, injured, or defaced by them.

To the Company's defence the plaintiffs demurred, on the ground that it was insufficient in law; but the demurrer was overruled, and hence the appeal.

In the course of their judgment, the Court said: Chapter 37 of the laws of 1848, authorizing the formation of gaslight companies, provides in section 18 that "any corporation formed under this Act shall have full power to manufacture, sell, and furnish such quantities of gas as may be required in the city, town, or village where the same shall be located for lighting the streets and public and private buildings, or for other purposes; and such corporations shall have power to lay conductors for conducting gas through the streets, lanes, alleys, and squares in such city, village, or town, with the consent of the municipal authorities, and under such reasonable regulations as they may prescribe." The defendant Company was not incorporated under the General Act of 1848, but by special Charter under the Act of 1866, which provided that "no public street or highway in the city of New York shall be dug into, injured, or defaced without the permission of the municipal authorities first had and obtained: Provided that such permission shall not be required if the majority of the owners of the street or highway so dug into, injured, or defaced shall give their consent thereto in writing." Section 5 of the Act provides that the Company "shall be subject to all the provisions, duties, and obligations contained in, and be entitled to all the benefits and privileges conferred by, an Act entitled, 'An Act to Authorize the Formation of Gaslight Companies,' passed Feb. 16, 1848, and the Acts amendatory thereof and additional thereto, except that all Acts and parts of Acts inconsistent with sections 1, 2, 3, and 4 of this Act are repealed and declared to be inoperative so far as the same are applicable to this Act."

We think that the proviso in section 1 of the Act—viz., that no public street shall be dug into without the permission of the municipal authority, provided that such permission shall not be required if the majority of the owners in interest of the property immediately adjoining such street shall give their consent in writing—is inconsistent with that portion of section 18 of chapter 37 of the Act of 1848 which provides, "and such corporation shall have power to lay conductors for conducting gas through the streets, lanes, alleys, and squares in such city, village, or town, with the consent of the municipal authorities, and under such reasonable regulations as they may prescribe;" and that therefore by section 5 of the Act of 1866 the provision was repealed and declared to be inoperative, so far as the same is applicable to this Act; that by the Act of 1866 the franchise given by the State was perpetual, full, and complete, and required no secondary franchise from the City, by the consent of the legislative body, to make it effective within the interpretation of the provisions of section 18 of the Act of 1848. And, further, that these provisions in regard to permission to dig, either by the municipal authority or by the majority of the adjoining property owners, was the administrative consent to the particular place, time, or circumstances of such digging, provided for in other provisions of law, under the cognizance and control of the administrative officers in charge of the streets.

The defendants having a perpetual franchise from the State, subject to no limitations by the local legislative body, the permission given by the resolution of the Common Council, with its limitation of thirty years, to lay pipes, was ineffective as a limitation upon the power given by the Legislature under the franchise granted to the defendants. Even if the Board of Aldermen had power to limit the permission for thirty years, that limitation applied only to the right to lay pipes. Having been once granted and acted upon, no right was reserved affecting the continuance and maintenance of the pipes so laid under permit, and certainly no right to order their discontinuance and removal. As the State had given a perpetual franchise subject only to a condition subsequent on a permit to dig into the streets, when that permit had been granted and acted upon the power to continue was a necessary incident of the franchise granted by the State, and not subject to interference or revocation by the local authority. As the answer alleges that the defendants have obtained the necessary permission, and that they have not "dug into, injured, or defaced any street or highway without the consent of some one of the municipal authorities duly authorized by law in respect thereto," it is not insufficient in law. The demurrer was properly overruled; and the judgment should be affirmed.

Manchester Gas Officials' Salaries.—The list of increases of salaries prepared for the March meeting of the Manchester City Council shows a total of £3300, of which the Gas Committee are responsible for £530. It is recommended by the Committee that the salary of Mr. J. G. Newbigging, the Chief Engineer, be advanced from £1100 to £1200 per annum; that of Mr. J. R. Hill, the Manager at the Bradford Road Station, from £450 to £475; that of Mr. F. P. Smith, Accountant, from £400 to £425; that of Mr. G. W. Tooley, Manager at the Rochdale Road Station, from £375 to £400; that of Mr. T. Williams, Chief Cashier, from £375 to £400; and that of Mr. F. J. Caldecott, Chief Rental Clerk, from £350 to £375.

MISCELLANEOUS NEWS.

GASLIGHT AND COKE COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 291.]

The accounts of the Company for the six months ended Dec. 31, to be submitted with the Directors' report on Friday, consist of the usual statements, from which we take the following particulars.

The statement of capital (stock) sets forth that the total paid up is £9,466,500; added on conversion, £12,176,565—total amount authorized, £21,643,065. Deducting the amount redeemed, £101,655, the total amount of the Company's existing capital powers is £21,541,410. The statement of loan capital stands thus: Total paid up, £2,844,000; added on conversion, £1,479,975; unissued, £750,000—total amount authorized, £5,073,975.

The capital account shows receipts (with premiums, £1,586,807 11s. 9d.) to the amount of £27,452,192 11s. 9d. The expenditure is shown in the following items:—

Expenditure to June 30, 1909		£13,505,836 10 1
Expenditure during the half year to Dec. 31, 1909—viz.,		
Buildings and machinery in extension of works	£1,728 8 8	
New and additional mains and service-pipes	15,610 9 11	
Do. do. meters	24,293 16 4	
Do. do. stoves	34,553 5 3	
		76,186 0 2
		£13,582,022 10 3
By depreciation of plant	£3,677 3 10	
By depreciation of meters and stoves	42,099 18 11	
		45,777 2 9
Total expenditure		£13,536,245 7 6
Nominal amount added on conversion		13,656,540 0 0
		£27,192,785 7 6
Deduct amount of capital redeemed under Company's Act of 1903		101,655 0 0
		£27,091,130 7 6
Balance of capital account		361,062 4 3
		£27,452,192 11 9

The balance applicable to the redemption fund and to dividend on the ordinary stock is £820,295 19s.; and the following statement shows how it is proposed to appropriate it:—

Dec., 1908.			
£412,298	..	Net balance brought from last account	£409,893 4 4
364,687	..	Net revenue for the half year	410,402 14 8
£776,985			£820,295 19 0
10,000	..	Contribution to redemption fund	10,000 0 0
(£4 10s. 8d. p. ct.)		Dividend on the ordinary stock—	
£343,662	..	£4 13s. 4d. per cent. per annum on £15,141,545	353,302 14 4
£423,323	..	Balance carried to next account	£456,993 4 8

The following is the revenue account:—

Expenditure.

December Half Year, 1908.		£ s. d.	£ s. d.
	Manufacture of gas—		
£561,955	Coal, including all expenses thereon	489,615 8 4	
83,880	Oil ,, less value of oil tar	67,656 14 5	
33,758	Coke and breeze used in the manufacture of carburetted water gas	33,793 7 6	
14,891	Salaries of Engineers and other officers at works	14,652 0 4	
90,948	Wages	87,283 16 8	
12,685	Purification	11,311 12 0	
175,049	Repair and maintenance of works and plant, materials and labour, less received for old materials, £4980 9s. 3d.	188,462 8 10	
	Distribution of gas—		892,075 8 1
45,308	Salaries and wages of officers (including rental clerks)	47,420 3 10	
54,994	Repair and maintenance of mains and service-pipes, &c.	51,421 17 4	
52,015	Repair and renewal of meters	62,278 4 8	
55,486	,, ,, stoves	55,996 16 7	
34,139	Gas fittings, including labour (automatic meter supplies)	31,817 5 1	
			248,934 7 6
19,953	Public lamps—lighting and repairing	..	19,572 18 10
	Rents, rates, and taxes—		
5,895	Rents payable	5,891 0 4	
142,326	Rates and taxes	143,444 15 1	
	Management—		149,335 15 5
2,750	Directors' allowance	3,750 0 0	
202	Company's Auditors and Assistant	202 2 [illegible]	
8,184	Salaries of General Manager, Secretary, Accountant, and clerks	9,067 6 [illegible]	
22,831	Collectors and cashiers	22,879 9 0	
5,766	Stationery and printing	6,644 14 0	
5,740	General charges	6,526 18 9	
			49,070 10 4
..	Co-partnership for the half year	..	13,000 0 0
828	Parliamentary charges	..	2,087 1 1
1,468	Law charges	..	1,066 19 7
7,559	Bad debts	..	8,220 11 10
500	Depreciation fund for works on leasehold lands	..	500 0 0
25,284	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	25,888 2 3
1,695	Workmen's compensation account	..	1,664 17 2
..	Stamp and Conveyance Duties under the Company's Act of 1909, on Account	..	12,000 0 0
	Public officers—		
766	Gas Referees and Official Auditor	873 4 2	
604	Public testing-stations	650 14 11	
			1,523 19 1
£1,467,519			1,424,940 11 2
559,535	Balance carried to net revenue account		614,583 19 2
£2,027,054			2,039,524 10 4

Receipts.

December Half Year, 1908.		£ s. d.	£ s. d.
£1,418,616	Sale of gas— Per meter, at 2s. 9d. and 2s. 4d. and 2s. 2d. per 1000 cubic feet	1,450,395 11 11	
74,638	Public lighting and under contracts	68,319 4 6	
			1,518,714 16 5
£1,493,254			
28,743	Rental of meters (ordinary)	..	28,183 1 3
42,362	Rental of stoves	..	45,372 13 1
63,901	Rental of fittings	..	74,498 18 5
	Residual products—		
£258,864	Coke, less £34,711 15s. 9d. for labour, &c.	228,880 5 0	
15,337	Breeze, less £6338 11s. ,,	19,214 5 11	
43,865	Tar and tar products	49,350 7 4	
75,844	Ammoniacal liquor and sulphate of ammonia	79,041 15 6	
			367,516 13 9
£393,910			
£4,591	Rents receivable		4,640 17 5
233	Transfer fees		297 10 0
£2,027,054			2,039,524 10 4

The three statements relating to the reserve, insurance, and depreciation funds, stood as follows on Dec. 31: Reserve fund, £67,902; insurance fund, £126,900; depreciation fund, £72,326.

The following statements relate to the working:—

Statement of Coal Used, &c.

Description of Coal.	In Store June 30, 1909.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1909.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	114,820	972,456	804,782	1,750	280,744
Cannel	4,082	..	483	..	3,599
Total	118,902	972,456	*805,265	1,750	284,343

* In addition to this quantity of coal, 7,237,568 gallons of oil and 19,191 gallons of spirit were used during the half year.

Statement of Residual Products.

Description.	In Store June 30, 1909.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store, Dec. 31, 1909.
Coke—tons	31,449	509,842	105,520	428,821	6,950
Breeze—tons	1,309	78,767	10,280	68,348	1,448
Tar, from coal only—galls.	659,043	7,970,289	7,622,325	45,112	961,895
Ammoniacal liquor—butts	22,030	240,181	237,495	2	24,714

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*12,109,500	445,772	10,846,734	11,424,918	46,863
†11,473,469	462,224	10,315,009	10,905,873	48,959

* Including 2,965,507,000 cubic feet of carburetted water gas. † Dec. half year, 1908.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £171,458; oil and petroleum spirit, £36,405; coke, £4073; tar and ammoniacal liquor and products, £93,179; and sundries, £220,820. The figures this time last year were: Coal, £158,609; oil and petroleum spirit, £40,883; coke, £11,717; tar and ammoniacal liquor and products, £107,441; and sundries, £213,665.

SOUTH METROPOLITAN GAS COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 291.]

The following are the principal portions of the accounts of this Company for the six months ending the 31st of December.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to June 30, 1909		£5,044,545 1 5
Expenditure during half year to Dec. 31, 1909, viz.—		
New and additional mains and services	£5,917 6 2	
New and additional meters	5,271 13 4	
New and additional stoves	6,893 7 6	
		£18,082 7 0
Total expenditure		£5,062,627 8 5
Balance		266,192 11 7
		£5,328,820 0 0
Nominal amount added by conversion, less premium		2,996,520 0 0
Total		£8,325,340 0 0

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal into store	£332,081 10 4	
Purification	10,101 13 5	
Salaries of Engineer and Officers at works	14,263 0 6	
Wages (carbonizing)	47,902 0 1	
Repairs and maintenance of works and plant, less £4557 12s. 4d. received for old materials	116,430 0 2	
		£520,847 4 6
Co-partnership		16,900 0 0
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes	£29,902 1 8	
Salaries and wages of officers, including rental clerks	19,163 12 1	
Repairing and renewals of meters	25,696 4 2	
Repairing and renewals of stoves	14,854 7 1	
Repairing and renewals of gas-fittings	35,054 18 2	
		144,671 3 2
Public lamps, including £19,067 6s. 10d. for labour and materials, less £14,855 5s. 2d. received for the same		4,212 1 8
Rents, rates, and taxes—		
Rents payable	£1,116 12 3	
Rates and taxes	44,094 13 5	
		45,211 5 8
Management—		
Directors' allowance	£2,687 14 11	
Salaries of Secretary, Accountant, and clerks	3,404 14 1	
Collectors { Ordinary	6,200 13 10	
Collectors { Slot meter	9,050 3 9	
Stationery and printing	3,479 13 1	
General charges	9,853 0 2	
Company's Auditors	112 10 0	
		34,788 9 10
Law charges	£1,246 2 7	
Parliamentary charges	6 6 8	
		1,252 9 3
Bad debts		2,198 12 9
Stolen from 4318 slot meters broken open		561 12 5
Pensions and officers' and workmen's superannuation, sick, and accident funds		7,900 13 10
Gas Referees and Official Auditor		251 11 0
Total expenditure		£777,695 4 1
Balance carried to net revenue account		220,978 4 3
		£998,673 8 4

Receipts.

Sale of gas—		
Michaelmas at 2s. 2d. per 1000 feet	£261,761 9 10	
Christmas, at 2s. 2d. per 1000 feet	379,970 2 0	
	£641,731 11 10	
Public lighting	16,565 14 0	£658,297 5 10
Meters in use (346,859)—		
Company's meters at rent: Ordinary, 97,667; slot, 240,978	£38,390 11 7	
Company's stoves at rent: Ordinary, 78,044; slot, 195,393; fires, 26,516	30,415 16 0	
		68,806 7 7
Residual products—		
Coke, less labour and cartage	£140,096 0 6	
Breeze, less labour and cartage	5,119 12 6	
Tar and tar products, less labour	30,711 1 1	
Sulphate of ammonia	54,489 6 2	
		230,416 0 3
Rents receivable		1,536 8 6
Transfer fees		98 12 6
Gas-fittings		39,518 13 8
Total receipts		£998,673 8 4

Total amount paid in salaries for half year, £35,511 5s. 0d.
,, ,, ,, wages ,, £269,431 2s 11d.

The net revenue account shows a sum of £255,378 7s. 11d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on Dec. 31 were as follows: Reserve fund, £181,171; renewal fund, £29,658; insurance fund, £99,273. The following statements relate to the manufacturing operations of the Company:—

Statement of Coal.

In Store June 30, 1909.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store December 31, 1909.
Tons.	Tons.	Tons.	Tons.	Tons.
140,385	671,680	563,205	831	248,029

Statement of Residual Products.

Description.	In Store June 30, 1909.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1909.
Coke—cwt.	553,320	6,964,385	1,906,786	5,438,299	172,620
Breeze—yards	10,178	128,058	44,974	82,065	11,197
Tar—gallons	719,346	5,347,527	5,608,218	39,347	419,308
Ammoniacal liquor—butts	9,885	197,883	195,573	..	12,195

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
6,624,378	177,577	6,076,126	6,335,690	23,743 incandes't 11 flat flame

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £136,358; coke and breeze, £5672; tar, sulphate, and ammoniacal liquor, £43,955; and sundries, £298,946. The figures this time last year were: Coal, £75,852; coke and breeze, £27,493; tar, sulphate, and ammoniacal liquor, £43,288; and sundries, £293,012. A sum of £15,123, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £52,149. The figures last year were £37,185 and £49,509.

LONDON COUNTY COUNCIL AND GAS SUPPLY.

At the Meeting of the London County Council to-day, the Parliamentary Committee will present a report on the legislative measures proposed for the coming session, as well as those passed last year. Among the former is the Gas Companies' Standard Burner (No. 1) Bill; and as any opposition on the part of the Council to this Bill has to be undertaken in accordance with the provisions of the Borough Funds Act, 1872, the Committee recommend that approval be given to the issue of a notice by advertisement of the Council's intention to consider the subject at their meeting next Tuesday.

In the portion of the report dealing with the legislation of the past session, the Committee refer to the Act of the Gaslight and Coke Company. They say the Bill sought to authorize the Company to lower the illuminating power of their gas from 16 to 14 candles, and reduce the standard price from 3s. 4d. to 3s. 3d. per 1000 cubic feet. The Council lodged a petition against the Bill, on the ground that the proposed reduction in price was the result of an arrangement arrived at between the Council and the Company in 1907, and that the Bill did not provide for any further reduction on account of the proposed lowering of the illuminating power. As the result of negotiations, an arrangement was come to with the Company, and the Council's petition was withdrawn.

The terms of the arrangement, the most important part of which was the establishment for the first time of a standard of calorific power, are given in a table at the end of the report. They are as follows:—

> Petition presented in House of Commons. Arrangement come to with the Company providing for (1) reduction of standard price by another 1d.—*i.e.*, from 3s. 3d. to 3s. 2d.; (2) a standard of calorific power of 125 calories net; (3) the supply to consumers by the Company, free of charge, of burners suitable for the consumption of gas of 14-candle power; and (4) the price charged by the Company for gas of 14-candle power south of the Thames to be the same as that charged by the South Metropolitan Gas Company for gas of the same illuminating power, in accordance with the Amalgamation Scheme of 1883, and for the price for public lighting in the whole of the Company's area to be the same as the Company's lowest selling price to any consumer. The Company also agreed that their Engineer should notify the Council when he proposed to lay any new mains in streets in which there are tramways. Further petition presented in House of Lords to secure drafting amendments, which were adjusted, and the petition was withdrawn. Bill passed.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In the report for the six months ending Dec. 31, which the Directors will present at the ordinary meeting on the 11th inst., they express their pleasure in stating that the recent sale of £30,000 of the Company's new stock (1881) realized £56,160; giving an average price of £187 4s. per £100 of stock—the total amount applied for having been £67,105. A new dock, which will give much greater accommodation to barges than the existing one, and also new coal-handling plant, will shortly be under construction at the Southall station. The Directors inform the shareholders that they have joined several other Gas Companies in the promotion of a Bill for the adoption of the "Metropolitan" No. 2 argand burner as a standard burner for the official testing of the illuminating power of gas.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £184,167; from meter and stove rents, to £20,976; and from the sale of residual products to £34,391—rents and transfer fees making up a total of £239,576, compared with £238,204 in the corresponding period of 1908. On the other hand, the manufacture of gas cost £130,986; distribution, £40,258; and management, £7853—a total expenditure of £196,885, against £208,476. The balance carried to the profit and loss account is £42,691, compared with £29,728 this time last year. The amount available for distribution is £87,806; and the Directors recommend the declaration of the usual dividends at the rates of 5, 12½, and 9½ per cent. per annum, subject to income-tax, on the preference, consolidated, and new stocks respectively.

The working statements show that 84,684 tons of coal and 1,446,673 gallons of oil were used in the production of 1,461,885,000 cubic feet of gas (including 517,448,000 cubic feet of carburetted water gas), of which 1,332,775,000 cubic feet were sold and 1,351,775,000 cubic feet were accounted for. The estimated production of residuals was: Coke, 53,042 tons; breeze, 7629 tons; tar, 1,050,445 gallons; and ammoniacal liquor, 27,106 butts.

TOTTENHAM AND EDMONTON GAS COMPANY.

Half-Yearly Report and Accounts.

At the Half-Yearly Ordinary General Meeting of the Company on Saturday, the Directors will report an increase of 6·13 per cent. in the sales of gas in the six months ending the 31st of December, compared with the corresponding period of 1908. There was an addition during the twelve months of 3803 consumers, and an increase of 3291 in the number of cooking and heating stoves. The accounts accompanying the report show that £14,528 was expended on capital account in the half year; £8119 being for new mains and service-pipes, including laying and other work connected with distribution, £2101 for meters, and £2439 for new cooking-stoves. The sale of gas produced £92,050; the rental of meters, stoves, and fittings and the maintenance of incandescent mantles, £15,410; residuals brought in £19,134; and the total revenue was £126,630. The expenditure on the manufacture of gas was £70,794, including £37,166 for coal, £9925 for oil and coke used in making water gas, and £16,079 for the repair and maintenance of works and plant; on distribution, £19,703; on management, £4341; and for the co-partnership scheme, £1200—the total expenses being £104,436, leaving £22,194 to be carried to the profit and loss account. The amount available for distribution, with £18,592 brought forward, is £36,054; and the Directors recommend the payment of the full statutory dividends of 6⅞ and 5⅝ per cent. per annum on the "A" and "B" stocks. This will absorb £15,372, and leave £20,681 to be carried forward. The Directors consider that the position of the Company's business justifies a further reduction in the price of gas; and they have accordingly lowered it 1d. per 1000 cubic feet from the reading of the meters last Christmas—making the present price 2s. 4d.

The working statements in the account show that 48,408 tons of coal and 590,112 gallons of enriching oil were used in the production of 834,419,000 cubic feet of gas, of which 758,156,000 cubic feet were sold and 774,127,000 cubic feet accounted for. The residual products were: Coke, 29,044 tons 16 cwt., of which 6611 tons 4 cwt. were used for making coal gas, and 5255 tons 10 cwt. for producing carburetted water gas; breeze, 4598¾ chaldrons; tar, 491,393 gallons; and ammoniacal liquor, 13,447 butts. The quantity of sulphate of ammonia made in the half year was 378 tons 14 cwt. 2 qrs. 6 lbs.

BURTON-UPON-TRENT GAS-WORKS EXTENSIONS.

Inauguration of a New Gasholder—Presentations to the Mayor and the Chairman of the Gas Committee.

Last Friday afternoon, the Mayor of Burton-upon-Trent (Mr. T. Jenkins) formally inaugurated a new holder which has been erected at the gas-works as part of the scheme of reconstruction to which reference has been made from time to time in the "JOURNAL." His Worship was accompanied by the ex-Mayor (Alderman Tresise), Alderman T. E. Lowe (the Chairman of the Gas Committee), members of the Corporation, Mr. T. N. Whitehead (the Town Clerk), Mr. O. W. Arnold (the Borough Treasurer), Mr. J. Ferguson Bell (the Consulting Engineer to the Gas Committee), Mr. R. W. Thompson (representing Messrs. Clayton, Son, and Co., Limited, builders of the holder).

The party were received by the Manager (Mr. R. S. Ramsden), and assembled in his office, where Alderman Lowe explained, by means of plans, the proposed reconstruction of the retort-houses. In the course of remarks, he said he thought everybody would agree that the Gas Committee had not allowed the grass to grow under their feet, and that their reconstruction scheme was well on its way. In addition to the new holder, No. 5 retort-house had been rebuilt, and was now doing extremely good work. The new retorts had been in use for two months; and though the Committee had not yet realized the full advantage of them, the monthly returns showed that they were getting better and worked more economically. The new holder, which had been erected by Messrs. Clayton, Son, and Co., of Leeds—a very eminent firm who had erected other 200 such structures all over the country—had been built extremely well; and the Committee were well satisfied with the work. It had a capacity of more than the other two holders together; and its cost was about £10,000. Alderman Lowe gave particulars of the rest of the scheme, and said the total contract price was £15,620. He hoped and believed that when they had the retort-houses completed they would have works which would be thoroughly up to date, and which would not only meet the requirements of the town, but prove of great financial assistance to it.

The company then proceeded to the new holder, and the Mayor turned on the gas for the supply of the town.

Returning to the offices, the party witnessed two interesting presentations in connection with the inaugural ceremony. Mr. Bell, on behalf of Messrs. Clayton, presented the Mayor with a handsome silver rose-bowl; and he also asked Alderman Lowe's acceptance of a silver salver, as a gift from himself. He said that the present to the Mayor was offered as a small token to commemorate the occasion. The inscription, which was as follows, was surmounted by the borough arms:—

> County Borough of Burton-upon-Trent. Presented to his Worship the Mayor (T. Jenkins, Esq.) to commemorate the completion of the large gasholder and steel tank erected at Burton Gas-Works by Messrs. Clayton and Sons, Limited, of Leeds.—Jan. 28, 1910.

Mr. Bell's present to Alderman Lowe was inscribed as follows:—

> Presented to Alderman T. E. Lowe, J.P., Chairman of the Gas and Electricity Committee, to commemorate the completion of the gasholder and steel tank erected at the Burton-on-Trent Gas-Works. Engineer, J. Ferguson Bell, M.Inst.C.E., Jan. 28, 1910.

In making the presentation to the Mayor, Mr. Bell said he did so on behalf of Mr. Clayton, who was prevented by illness from attending. The rose-bowl resembled the gasholder, because it was artistic in design; and he hoped his Worship would accept it as a mark of their appreciation of his kindness in performing the opening ceremony.

The Mayor expressed his thanks, and assured Messrs. Clayton, through Mr. Bell, that he would appreciate their present very highly. His Worship paid a high tribute to the way in which the Committee had discharged their duties. Under the able chairmanship of Alderman Lowe, they had sought to bring the gas-works up to date; and they were to be complimented on the fact that the strides they were making were effecting great improvements. Having briefly sketched the history of gas making in Burton, his Worship concluded by congratulating the Committee, on behalf of the town, on the excellent results of their labour, and wished them continued prosperity.

Before making his presentation to Alderman Lowe, Mr. Bell, in the course of an interesting speech, traced the development of the gas supply to the town, and said it could now be regarded as a much-improved and up-to-date concern. He referred to the recent tour to Germany, and said the visit had proved of great value to the Committee in the discharge of their duties, as they had learnt much that

was very useful in the important matter of managing gas-works. Referring to the new holder, he said the work had been carried out splendidly; and he expressed his obligations to Mr. Ramsden for the great assistance he had given him. By his valuable help, his (Mr. Bell's) duties had been rendered much lighter; and he was much obliged to him. In asking Alderman Lowe's acceptance of the salver, he said they all knew the great interest he took in all matters regarding the town's welfare; and some of his best and most useful work was done in the capacity of Chairman of the Gas Committee.

Alderman Lowe assured Mr. Bell that he very much appreciated his kind present. He thought they could feel confident that the work upon which they were engaged was in the very best interests of the town; and when it was finished it would be a credit to those who were responsible for it. The extension scheme, when completed, would mean that gas could be manufactured at a cheaper rate, and eventually the consumer would reap the benefit. Alderman Lowe mentioned that it was a matter of satisfaction that the Council would not have to obtain a loan in order to carry on the work, as the cost would be defrayed out of the reserve which the Committee had gradually built up.

ILLUMINATING POWER OF CARDIFF GAS.

Comparative Tests by the Gas Examiner.

Some time ago, the Gas Examiner to the Cardiff Corporation, acting upon instructions he had received, made a number of tests to determine the difference in the illuminating power of the gas, as shown by the "Metropolitan" No. 2 argand burner, which is the one imposed by the Cardiff Gas Act of 1906, of the "London" argand burner, which was used for testing the gas until the alteration imposed by the Act named, and by a standard flat-flame burner—all consuming the gas at the rate of 5 cubic feet per hour. He has lately presented his report, from which the following particulars are taken.

A test was made with one of the experimental burners, and the result noted. This burner was then removed and immediately replaced by the other, the rate of consumption of the gas readjusted, and a further test made. Of sixteen tests with each of the argand burners, he found the average of the "Metropolitan" tests to be 14·95 candles, and that of the "London" tests 11·93 candles; thus showing that the former burner gives an illuminating power of 3·02 candles in excess of that given by the latter with the same gas. Of ten tests made with the "Metropolitan" argand burner against a standard flat-flame burner, the difference was an average of 4·32 candles in favour of the argand. This burner consequently gives an illuminating power of some 3 candles in excess of the "London" argand burner, and rather more than 4 candles in excess of the standard flat-flame burner, all consuming gas at the rate of 5 cubic feet per hour. The Examiner remarks that this is the average; but individual tests give as much as 4 candles in favour of the "Metropolitan" as against the "London" argand, and as much as 4⅝ candles against the standard flat-flame burner.

Referring to the contention that the "London" argand burner is not so well adapted for testing the present quality of the gas, and that it develops a relatively smaller amount of light than with gas enriched with cannel coal, the Examiner admits that there is possibly something in the contention as regards the "London" argand burner. But he says it would not apply to the flat-flame burner. Even as regards the "London" argand burner, the difference would not be much; and the comparison would still be fairly correct. He adds: "It will therefore be seen that the illuminating power of the gas is not only liable to be reduced from 16 to 14 candles allowed by the Act of Parliament of 1906, but also the authorized adoption of the 'Metropolitan' No. 2 burner for testing gives a further advantage of some 3 candles in favour of the gas, since it gives so much more light than the 'London' argand burner from the same gas; allowing, in all, a reduction of some 5 candles in the illuminating power as compared with what it was previous to the Act of 1906, when the 'London' argand was used for testing."

The Examiner reports that the average illuminating power of the gas at the City Hall during the 33 months that the "Metropolitan" No. 2 burner has been in use for testing was 15·85 candles, and that the average with the "London" argand burner for a similar period previous to the adoption of the new burner was 16·91 candles; so that as yet the gas has only been nominally reduced 1 candle. Actually, however, there is also the additional advantage obtained for the gas by the change of the test-burner; so that he considers the illuminating power of the gas has been reduced some 4 candles as compared with what it was previous to the changes authorized by the new Act. He explains that the tests were made with the standard flat-flame burner because it is the type ordinarily used for household and street-lighting purposes; and it was found that gas giving an illuminating power of 15 85 candles with the "Metropolitan" No. 2 burner would give a little less than 12 candles when tested by the standard flat-flame burner with 5 cubic feet consumption per hour. The ordinary street burner, however, only consumes 4½ cubic feet, and gives a lower illuminating power in consequence of the smaller consumption of gas. He points out, in conclusion, that since the passing of the Act of 1906 the price of gas has been reduced by 2d. per 1000 cubic feet.

After providing for depreciation, &c., the accounts of the "National" Gas-Engine Company, Limited, for the past year show a net profit of £41,682. The Directors recommend a further dividend of 10 per cent.; making 20 per cent. for the year—the same as for 1908. The sum of £10,000 has been added to reserve (making it £100,000); and £9943 will be carried forward. In order to meet extra expenditure to be incurred in connection with an extension of works, the Company announce the issue of the balance of 50,000 preference and 50,000 ordinary shares at par. These will be offered to existing shareholders in the proportion of one preference and one ordinary share for every three shares held.

GLASGOW CORPORATION GAS DEPARTMENT.

The Question of New Show-Rooms.

The Gas Committee of the Glasgow Corporation recommended to the Town Council last Thursday that premises in Sauchiehall Street be leased as a show-room for gas appliances.

Ex-Bailie M. W. Montgomery, the Convener, in moving approval of the minute, said that the rent of the premises they at present occupied in Union Street was £500. The area was 326 square yards; whereas in the Sauchiehall Street shop there was an area of 1100 square yards—about four times the present accommodation—while the rent would be only £100 more. The proposal was to enter into a lease for ten years, with a break on either side at the end of five years. Bailie Paxton, the Sub-Convener, in seconding, referred to the bearing a gas show-room would have upon the subject of air purification. The Corporation had resolved to enter upon a scheme of air purification, and a show of gas appliances would help forward the movement, and would also develop the consumption of gas. Mr. Moir said he was an enthusiastic supporter of the proposed change; and he took no exception to anything in the minute except to the portion which referred to gas appliances. They were all united in the work of air purification; but this work was not confined to gas appliances, and he suggested that all modern heating appliances be included.

Treasurer Graham reminded the Council that a year ago he objected to the proposal, not so much on account of the taking of the property, but because the Gas Committee wanted to go in for a much larger scheme for the improvement of gas stoves and appliances. The Committee then promised that when the accounts came up for consideration they would bring forward a scheme as to their policy. The accounts came up; but there was no statement of policy, and he did not think the Committee had treated the Corporation well in so doing, after having had twelve months for the preparation of a statement. They should have a statement from the Committee as to their policy; and he accordingly moved that the minute be taken back. Mr. P. G. Stewart seconded. He wanted to know what the people in the east-end and the south-side were to do. The Corporation had empty shops at present in Trongate; and if they wanted to reach the industrial classes, they should give an exhibition there. The Committee, however, evidently wanted to have a show in Sauchiehall Street for the wealthy west-end people. The Committee should take the minute back and give the Corporation further information. Bailie Mathieson supported the amendment. The minute simply brought up an old scheme in a new guise. He had not the slightest objection to the Gas Committee exhibiting stoves and heating appliances; but he did object to the Gas Department selling gas fittings, mantles, and burners, against their own ratepayers outside. There was a great deal of apprehension among dealers in these articles, as to whether extended premises would mean extended sales by the Gas Department. There was no mention, moreover, of the initial cost of transferring the premises, which he believed would amount to at least £1000. Bailie Guest thought the matter should be sent back to the Committee. He did not think the proposed premises were suitable for the purpose. Moreover, the Gas Committee had not implemented their promise to produce a tabulated statement showing the conditions under which such a show-room was to be carried on, and the financial results which would be likely to accrue. Mr. W. F. Anderson said they were all interested in air purification. He did not object to the relinquishing of the Union Street shop; but he thought that Argyle Street was a much better place for such a show-room than Sauchiehall Street.

Bailie Alston said he would have been better pleased had the minute been a joint one by the Electricity and Gas Committees; but he supported the recommendation because of the central position of the premises, and because by and by the Gas Committee would see it to be their duty to open show-rooms in the working-class districts of the city. He was in favour of making a start in these central premises. Bailie Russell asked if the question of air purification was any justification for taking these extensive premises. If so, he was quite agreeable to the proposal of the Committee; but he wanted the Convener to make it clear that the business carried on would not in any way interfere with the tradespeople in the city. It was only on such grounds that he could support the proposal. Mr. Montgomery, in closing the discussion, said he desired to assure every member of the Corporation that there was absolutely no change of policy, so far as the Gas Department were concerned, in the proposal to go to new premises. As to sales, the Corporation were aware that recently the Committee entered into an agreement with the Ironmongers' Association with which that body was abundantly satisfied; and there was not the slightest idea of departing from the agreement, which had been amicably entered into and faithfully carried out by all parties. There was absolutely no policy in the matter at all, except the question of whether the Sauchiehall Street or the Union Street premises were the better value and the more suitable for the purposes of the Gas Department. On a division, the minutes were approved by a large majority.

COST OF GAS AND ELECTRIC LIGHTING.

The Engineering Supplement to "The Times" last Wednesday contained the following answer by their contributor to the letter on the above subject by Mr. Hanbury Thomas, of Sheffield, which was reproduced in the "JOURNAL" last week (p. 247).

Mr. Hanbury Thomas objects to my statement that metal filament lamps, if properly installed, provide a cheaper and healthier light than gas-mantles. He states that I should add that "the comparison was with gas at at least 5s. per 1000 cubic feet—a price which is only charged in villages." I have just as much cause to object to the comparison which he makes in his circular, of electric light at 4d. per unit, with gas at 1s. 4d. per 1000 cubic feet—a price which is only charged in places like Sheffield. If we make theoretical comparisons at all, it is fairer to take the average price charged for gas throughout the

country, which is much nearer 3s. than 1s. 4d. But, as a matter of fact, comparisons based on theory or laboratory tests have no practical value; the most reliable comparisons are those based on actual experience. It has never been denied that the initial light emitted by a gas-mantle costs less than that emitted by a metal filament lamp of equal candle power. But in actual practice we have not to deal with initial light; and it is within the experience of all who use gas-mantles that their light falls off very rapidly, which is not the case with metal filament lamps. Apart from this, it is a well-known fact that light from electric lamps is much more easily reflected and concentrated than that from gas-mantles, owing to the difficulty of adapting suitable shades or reflectors to the latter, on account of the heat which is generated, and also on account of the shadow from the burner. Hence, with electric lamps a larger amount of the hemispherical candle power may be concentrated where it is required than with gas-mantles, which waste much of their light on the walls and ceilings. Experience has shown that those whose houses were previously illuminated by incandescent mantles have, on substituting metal filament lamps with proper reflecting and dispersing shades (such as "Holophane" glass), been able to effect a considerable saving in their lighting bills, with additional illuminating effects. In my own house, after installing tantalum lamps with "Holophane" glass, I was able to show, on an installation of about 15 lights, an annual saving of close on £4 in my lighting bill. Incidentally the annual cost of lamp renewals is less than that of mantle renewals; and ceilings remain clean for longer periods. No doubt Mr. Hanbury Thomas will meet the last assertion by a favourite argument of gas advocates, that gas is more healthy because it necessitates more frequent whitewashing and decorating, and thus helps to destroy the bacteria which infest the decorations! Such an argument is on a par with the one which he puts forward in regard to the hygienic aspect of gas. The products of combustion, being heavier than air, cannot be got rid of merely by the use of a ventilator or by keeping the top windows open. A draught has also to be created at a low level, which, perhaps, only Mr. Hanbury Thomas may consider hygienic. Even if carbonic acid gas is not in itself poisonous, it is injurious to health. Besides, the deleterious products of combustion of coal gas are not always confined to this one product. In conclusion, Mr. Hanbury Thomas forgets to mention that the combustion of a coal-gas burner absorbs more oxygen than that absorbed by an adult human being.

Following the foregoing answer was a letter by Mr. H. H. Holmes, formerly Sales Manager in the Electricity Department of the West Ham Corporation, and now filling a similar position with the Marylebone Corporation. In the course of it he said:

There is no doubt that gas can be made to show very efficient results in the laboratory; but laboratory tests are not practical figures. The true comparative costs of electricity and gas are quarters' bills in respect of each, under practical conditions, in similar circumstances; as also the true test of the market value of the light given is the consumer's own judgment of the light he gets, for the consumer is the person who has to be satisfied by both electricity and gas suppliers.

I append herewith six cases, taken quite haphazard, of bills for electricity for lighting purposes, and the bills for gas for the same premises for the corresponding period of the previous year. The prices of electricity and gas respectively are 3d. per unit and 2s. 8d. per 1000 cubic feet. A suggestion will probably be made that the consumers are not getting so much light with electricity as they were with gas, and that the lower cost of electric light is thus explained. But each consumer quoted has stated quite independently, and without any pressure from any source whatever, that the light he obtains from electricity is considerably better than the light he obtained from gas. Under these circumstances, the figures of cost speak for themselves.

In deciding which is the better illuminant and the less costly, the public are the only judges; and the fact that electric lighting is going ahead tremendously, while gas lighting is practically stationary, is an indication as to which the public favours the more.

Regarding the wonderful hygienic "advantages" of gas lighting quoted by Mr. Hanbury Thomas, I have several times pointed out in different publications that, although the ingenious statements of the gas interests may convince human beings, they have up to the present failed to convince plant life, which refuses to live and thrive in gas-lighted premises. I am sure that no more conclusive evidence of the absurdity of the gas interests' claims could be given.

B.—June, 1907, to March, 1908	Gas	£4	7 6
,, 1908 ,, 1909	Electricity	2	15 0
	Saving	£1	12 6
C.—Dec., 1907, to March, 1908	Gas	£4	0 4
,, 1908 ,, 1909	Electricity	1	8 0
	Saving	£2	12 4
D.—June, 1907, to March, 1908	Gas	£1	6 1
,, 1908 ,, 1909	Electricity	1	0 3
	Saving	£0	5 10
E.—June, 1907, to March, 1908	Gas	£7	1 0
,, 1908 ,, 1909	Electricity	3	13 6
	Saving	£3	7 6
F.—June, 1907, to March, 1908	Gas	£6	12 10
,, 1908 ,, 1909	Electricity	2	19 9
	Saving	£3	13 1
G.—June, 1907, to March, 1908	Gas	£1	6 3
,, 1908 ,, 1909	Electricity	0	16 0
	Saving	£0	10 3

METROPOLITAN WATER BOARD.

Financial Position of the Board—The Proposed New Offices.

At the Meeting of the Metropolitan Water Board last Friday, the members had under consideration a motion by Sir Melvill Beachcroft to the effect that the Finance Committee should be instructed to prepare and submit a full report on the financial position of the Board at the present time compared with that of the late Metropolitan Water Companies. Sir Melvill said the Board had had nearly two full years' work under the Charges Act, and they ought to know whether they had strained their full income. Up to March of last year they only just paid their way—there being a margin of about £2000; and in the current year their estimates showed considerable deficiency, which he hoped would not be verified. The Chairman (Mr. E. B. Barnard), while welcoming the resolution, expressed the hope that nobody would hold the notion that any innuendo of an unfavourable description was intended by it. It would be perfectly simple to show that the working under the Board, apart from the questions of additional quality and constant supply of water, compared in their favour as against the Companies. Mr. Tozer accepted the resolution on behalf of the Finance Committee, and it was agreed to.

There was also a lengthy discussion on a proposal brought forward towards the close of last year, to acquire a site for the erection of new central offices. The General Purposes Committee recommended a site in Kingsway, which will cost £100,000. In the course of the debate, however, a number of members favoured the utilization of land already owned by the Board in Rosebery Avenue, and an amendment was moved in favour of the latter site. Mr. E. G. Cole, the Chairman of the General Purposes Committee, said that he was quite satisfied that it was in the best interests of the Board that they should have their own offices, and that it would tend to the better administration of their work if they were in their own home. The only question was where they should be; and he asked the members to decide finally one way or another. On the question being put, it was agreed to accept the amendment that the new offices, if erected, should be on the Board's land in Rosebery Avenue. Upon the amendment being put as a substantive motion, Sir Melvill Beachcroft moved its reference back, on the ground of the present financial position of the Board. He thought the time was not opportune for them to carry out such a scheme. Mr. Karslake seconded the amendment, which was carried by 23 votes to 18.

LIABILITY FOR DEFECTIVE MAINS.

The Metropolitan Water Board and Compensation.

At the Meeting of the Metropolitan Water Board last Friday—the first after the Christmas recess—the *agenda* contained references to two matters bearing upon the liability of the Board for compensation for damage caused by burst or defective mains. Their nature will be apparent from the following particulars.

It appears that it has been the practice of the Works and Stores Committee of the Board to direct the Engineer to settle, without admitting liability, a large number of compensation claims by *ex gratiâ* payments, and without any consideration of the Board's negligence. Apart from the question of the policy of making such payments in cases where there is no legal liability upon the Board to pay, and the consequent encouragement of persons to bring claims against the Board on the smallest pretext, it is considered by the Law and Parliamentary Committee that the settlement of all such claims should be referred to them, seeing that, under the Board's order of reference, it is their duty to conduct the legal business. They deal with the matter at some length in their report, and emphasize the importance of uniformity of decision being attained in the settlement of claims; and they say this cannot result if two Committees are to deal with them on different lines. They therefore recommend that it should be referred to the General Purposes Committee to submit to the Board an amended order of reference, which shall include "all claims for damage and compensation to persons or property."

In order that the Board may fully appreciate their views and the scope of their recommendation, the Committee state the Board's legal position with regard to these claims. They point out that the Board, by reason of being a statutory authority, enjoy a protective position—that is to say, they are not liable for any damage which may arise from a burst main unless the person aggrieved can prove that they have been guilty of negligence. In the case, therefore, of a main belonging to the Board bursting, and the water therefrom flooding the premises of a private individual and doing damage, the Board, being authorized by Act of Parliament to lay the main, and not having been guilty of negligence, are not liable for the damage caused to the individual by reason of such flooding. The Board, however, would be liable if the person whose premises were damaged could prove that they had been guilty of negligence in the performance of their statutory obligations. The Committee support this statement by making the following quotation from the judgment of Mr. Justice Mathew in the case of *Green v. Chelsea Water Company*, which was confirmed by the Court of Appeal:—

In this case, the Water-Works Company obtained from Parliament the power to construct reservoirs and carry their mains and pipes under public thoroughfares, with the obligation that, when once the works are constructed, they shall continue to supply the public. It is clear that with no amount of care or skill can they prevent the bursting of one of their pipes, and the consequent damage that may be occasioned to those who may be living near to where the bursting has taken place. It is said that it would be reasonable to suppose that Parliament intended to impose upon them this obligation—namely, the obligation of insurers. But it is manifest that, though the particular injury may not be one of frequent occurrence, it is one that is incidental to the exercise of their statutory powers. In other words, it is impossible to carry on their undertakings without a liability of this sort. That being so, it is not because the damage may be frequent or constant in the case of a railway company, and only occasional in the case of a water-works company, that any sound distinction can be drawn. The principle of

one set of cases appears to me to be distinctly applicable to the other. This Water-Works Company could not carry on its business or exercise its statutory powers without exposing those who are adjoining proprietors to the risk of such damage as has been sustained in this case.

The subject was also dealt with at considerable length by the Works and Stores Committee in their report. The trouble between the Committees arose in respect of a resolution passed by the Board early in November, calling for full reports from each Committee in respect of a claim which had been made for compensation. Conferences took place; but it had not been possible to come to an agreement. To enable the Board to fully appreciate the position taken up by the Works and Stores Committee, they explain the procedure generally adopted by the late Water Companies, and continued by them. On the constitution of the Board, the question was taken up by the Committee, who adopted the following procedure, which, with slight modifications, has been in operation until the present time: (1) Where the Solicitor advises that there is contributory negligence on the part of the Board, the Engineer is authorized, through the medium of the District Engineers, to make immediate settlements in all cases of claims for damages, where the amount of such settlement does not exceed £10, and, with the consent of the Chairman of the Committee, in cases where the amount does not exceed £20; all such cases being subsequently reported to the Committee. (2) In all other cases, the Engineer submits the claims for the consideration of the Committee, who deal with them on their respective merits. (3) The Engineer employs local surveyors to assess the actual amount of damage sustained; and the offers to claimants are made without prejudice, under the Committee's authorizations, upon the basis of the surveyors' reports. An item has always been inserted in the expenditure of the Works and Stores Committee, under the heading "Claims for Compensation." In the estimates for the current year, it is £3000.

Since March 4, 1908, 167 claims for compensation have been placed before the Committee; 40 of them being cases in which there was no contributory negligence, but which were nevertheless settled. The general question of whether it is desirable for the Board to make payments to injured parties for damage sustained by them on account of the bursting of the Board's mains, where there is no contributory negligence on the part of the Board, is a matter of policy which the Committee submit for the Board's determination. They suggest that such determination will entail the following considerations: (1) Whether the Board will refuse to make any payment where there is no contributory negligence. (2) Whether the Board agree to deal with all cases on their respective merits, apart from the question of contributory negligence. (3) If the second consideration is adopted, whether the payments shall be made in all cases, or only in cases of hardship and suffering; and also whether the amount shall be the sum estimated by the surveyors appointed for the Board or a fraction thereof.

On the whole, the Committee are strongly of the opinion that, as the Board are legally entitled to make payments where there is no evidence of contributory negligence, all claims for compensation should be dealt with on their respective merits. They are the more constrained to this view on the ground that the Board, being a public authority, represents the community at large, and that therefore the greater or less liability to damage arising to certain sections of the public by the incidence of the proximity of larger or smaller mains should not be borne by the sufferers, who, from no fault of their own, are made the victims of accidents arising to the Board's works, but by the Board as representing the community.

The Committee point out that the recommendation of the Law and Parliamentary Committee does not settle the question of principle, but merely proposes to transfer to them the functions which have hitherto been carried out by the Works and Stores Committee. The latter Committee, however, see no reason for any such alteration in the practice. They venture to suggest that the matter has been satisfactorily carried out in the past; and that, bearing in mind the duties cast upon them by the Board in their order of reference, and also the important point that no question of law is involved, they should still be empowered to deal with the subject. They are of opinion that, having regard to all the circumstances, the most equitable course for the Board to adopt would be for them to deal with all claims or appeals for compensation in respect of damage caused by the bursting of their mains on the respective merits of each particular case. If the Board adopt this view, the Committee propose that all such claims shall be dealt with by a small Sub-Committee specially appointed for the purpose; and they express the hope that the Chairman of the Law and Parliamentary Committee will serve upon such Sub-Committee should it be formed. They conclude by recommending that all claims or appeals for compensation in respect of damage caused by the bursting of the Board's mains shall continue to be dealt with by them on their respective merits.

Trouble from a Gas Explosion.

The other matter on the *agenda* was the case of *Stacey v. Gaslight and Coke Company, Metropolitan Water Board, and West-End Tailoring Company*, reported in the "JOURNAL" for the 18th ult. (p. 185); and the Law and Parliamentary Committee deal with it in their report. They explain that the action was brought against the defendants jointly by Miss Jessie Stacey (an infant suing by her next friend) for damages for personal injuries sustained by her through an explosion of gas on premises in the Fulham Road; such explosion being alleged to have been primarily due to leakage of water from one of the Board's mains, which caused a subsidence of soil in which the Gas Company's main was laid. No leakage was discovered in the Board's pipes, and liability was accordingly denied. Notice was, however, served upon the occupier of the premises in the Fulham Road, and the defective communication-pipe repaired.

At the commencement of the case, Counsel for the plaintiff expressed his willingness not to proceed with it against the Tailoring Company, who had filed a petition in bankruptcy, if they would agree not to ask for costs. This was agreed to; and judgment was entered for them without costs. After evidence had been called on behalf of the plaintiff, Counsel for the Board submitted that there was no case to go to the Jury against the Board, on the ground that, even if the fracture of the gas-main had been brought about by the leakage of water from the communication-pipe supplying the premises, there was no evidence to show that the Board had been guilty of negligence in regard to it; and it was submitted, as a matter of law, that the owner of the premises was alone responsible for the maintenance and repair of his communication-pipe. Attention was drawn to section 8 of the Board's Charges Act, 1907, which imposed the liability upon the owner or occupier to maintain the communication-pipe; and to section 19 of the same Act, which empowered the owner or occupier to open the ground for the purpose of complying with the obligation to repair imposed by section 8. The learned Judge agreed that there was no evidence to show that the small leakage in the water-pipe caused or contributed to the escape of gas, and he also agreed that there was no evidence given of any negligence by the Board in reference to the broken communication-pipe. Judgment was accordingly entered for the Board. No order for costs against the plaintiff was asked for; but the Board reserved their rights against their co-defendants, the Gas Company. The case was then proceeded with and decided in their favour.

PATENT BLOCK TAR COMPANY, LIMITED.

In the "JOURNAL" for the 13th of July last, we referred to the then recently issued prospectus of the Patent Block Tar, Motor Oil, and Asphalte Company, Limited, copies of which had reached us from correspondents in various parts of the kingdom. The following particulars in connection with it, which appeared in the "Financial News" yesterday, will probably be perused with interest by many of our readers, especially the correspondents in question.

The other day we received what purported to be a letter from Sir C. B. Herne-Soame, Bart., whose name has frequently been mentioned in our articles on the Eaton group of gas and water companies. It contained an intimation that he had resigned his position, and was no longer in the group. The letter was written on notepaper with an embossed heading, and dated from Dawley, Salop, where Sir C. B. Herne-Soame resides. Before printing the intimation, however, we sent a reply-paid telegram of inquiry to the supposed writer, and to that message we have had no reply.

Meanwhile, there has come into our hands the prospectus of the Patent Block Tar, Motor Oil, and Asphalte Company, Limited, bearing, at the head of its front page, this statement: "Dividends of 150 per cent. on the entire share capital the Company's Manager and South Wales representative estimates, in his report to the shareholders at the general meeting, Sept. 7 last, held at Newport, can be paid out of the profit on orders, which, in his opinion, can be obtained on erection of the intended works in South Wales." This 150 per cent. concern has a share capital of £10,000, and the Chairman of the Directors is "Sir C. B. H. Soame, Bart., solicitor, Dawley, Salop." Clearly, even if Sir C. B. Herne-Soame has given up his association with the Eaton group, he is still interested in the issue of these small companies. The curious thing is that the Secretary and offices of this new concern are stated to be "E. T. Leaver, 77, High Street, Newport, Mon. (and London)." Now, the London office of the Company is to be found at 5, Dowgate Hill, Cannon Street, E.C., and on another floor of that building are domiciled half-a-dozen of the Eaton Companies. Is Sir C. B. Herne-Soame aware of their proximity to his new venture?

PLYMOUTH CORPORATION WATER SUPPLY.

Annual Report of the Engineer.

Mr. F. Howarth, the Water Engineer to the Plymouth Corporation, presented his annual report to the Water Committee last Friday. Owing to a decrease of 12·61 per cent. in the average rainfall on the gathering ground, there were 106 days during the year on which the storage reservoir did not overflow and compensation was paid out of the reservoir, compared with only 18 days before. The total quantity of water withdrawn was 143 million gallons, compared with 5 millions. Among the improvements effected was the cutting out of the defective joints in the masonry walls of the Drake's Place service reservoir, and the pointing of them with cement mortar; the result being that the leakage was reduced from 330,000 gallons per day with 9 ft. 9 in. of water in the reservoir to 27,500 gallons a day with 11 feet in the reservoir. A new main had been laid between the reservoir at Roborough and the one at Hartley; thus rendering the town much safer against the occurrence of a water famine in the event of bursts in the old main. The estimated cost of this work was £13,317; and it was carried out for £11,928. The agreement with the Stonehouse District Council with regard to the charge for water in excess of the quantity stipulated in the Stonehouse Water Act, 1893, had expired, and a new agreement had been entered into whereby the price of such excess water was raised from 3d. to 6d. per 1000 gallons for a period of five years. The daily average consumption of water during the year was 5,964,000 gallons—an increase of 280,000 gallons on the previous year, and was equal to 39·10 gallons per head. The income from water-rentals was £31,621, and the total income from all sources £32,524, or £293 more than in the previous year. The cost of maintenance and management was £9627, or £229 less than last year; while interest and other capital charges amounted to £17,386. The gross profit was £22,896, showing an increase of £522; and the net profit in aid of the rates was £5510—an increase of £680 on the previous year. The expenditure on capital account during the twelve months was £9841—making a total expenditure of £381,343; while the amount repaid or provided for in the redemption fund was £111,888.

Messrs. Balcke and Co., Limited, of Clement's Lane, E.C., have just brought out a new catalogue of their horizontal and vertical centrifugal pumps, which are made in a great number of sizes, and for both high and low lifts. The catalogue is well got up; the illustrations of the pumps being very clear and effective.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I mentioned last week that Lord Provost M'Innes Shaw, of Glasgow, had called a meeting of citizens for Wednesday next, for consideration of the subject of air purification. The meeting, it is expected, will result in the formation of a Glasgow and West of Scotland Branch of the Smoke Abatement League of Great Britain. It is intimated that coalite is now being used in the fires in the Lord Provost's rooms in the City Chambers, and that Mr. A. Wilson, the Gas Engineer, is at present inquiring into the comparative costs of coalite and ordinary household coal-fires. Coalite is also being used in the offices of the "Glasgow Herald," with results which are said to be entirely satisfactory. Is the recommendation of coalite to the public to be a Scotch movement?

The Town Council of Pollokshaws, one of the minor municipalities which have not yet come under the rule of Greater Glasgow, have been considering the Provisional Order which is being promoted by the Corporation of Glasgow for the consolidation of the Gas Acts, and they have prepared a petition for presentation to the Secretary for Scotland, in which they state a number of objections to the proposals contained in the Order. They take exception to clause 21, under which the promoters might acquire lands, not exceeding in the whole 30 acres, in no sense adjacent or contiguous to any existing lands held by them for their gas undertakings, in the midst of a purely residential area, and might thereby destroy the amenity of a locality, and depreciate the value of adjoining property belonging to the constituents of the petitioners. Objection is also taken to clause 26 (2), on the ground that it would be open to the Corporation to charge rates for the supply of gas to public lamps belonging to local authorities of police burghs and other districts outside the area of the city of Glasgow higher than the rates charged within that area. There are also objections to clause 49, under which authority is sought to apply the profits of the gas undertaking to the general purposes of the city. The petitioners submit that any surplus profits ought not to go for the benefit of the inhabitants of Glasgow, of whom a considerable proportion may use no gas, but should be applied in the interests of the gas consumers as a whole. Under clause 49, it would be open to the Corporation, in virtue of their statutory monopoly of supply, to maintain the price of gas at a higher rate than would be absolutely necessary, in order to earn surplus profits which might be applied to reduce the rates within the city area.

We who are understood to have some knowledge of the properties or propensities of coal gas are disposed to castigate people not so enlightened when they attempt to search for an escape of gas with a naked light; but a statement in the "Glasgow Herald" of to-day would seem to point to the objectionable practice being not unknown among those who ought to know better. The statement is that "John M'Knight, a gas-fitter in the employment of the Corporation Gas Department, was badly burned about the face and hands as the result of a gas explosion in a house at No. 45, Abert Drive, Pollokshields, yesterday. M'Knight had been sent to look for an escape of gas in the house; and while he was standing on the steps of a sunk flat endeavouring to locate the escape with a naked light, an explosion occurred. M'Knight was thrown down; and the tenant of the house, Mr. Alex. M'Laren, was also slightly hurt. One of the steps leading to the front door was dislodged by the force of the explosion. The incident created considerable alarm, and detachments of the Queen's Park and the Southern Fire Brigades were summoned; but their attendance was not required. M'Knight, after receiving temporary treatment, was removed in an ambulance waggon to the Victoria Infirmary."

Mr. Balfour, who is a representative of Portobello in the Town Council of Edinburgh, at a meeting of the Council on Tuesday, when the reports as to the analysis of gas were submitted, referred to the state of the gas at Magdalene Bridge, which, he said, was "like a farthing candle." The Town Clerk explained that the Gas Commissioners had power to supply gas of 14-candle power, as tested at the City Chambers. The matter then dropped. Magdalene Bridge is a long way beyond the City Chambers from the Granton Gas-Works; and it may be that in the severe weather which we have been experiencing, and the heavy consumption, the illuminating power of the gas may not have been so good as in more highly-favoured districts, while all the time the supply may have been in every respect up to statutory requirements. In this free country, everyone is at liberty to grumble; but a town councillor should surely at least grumble with reasonableness, and not as if special provision should be made for his particular locality.

It is intimated in the "Dundee Advertiser" of yesterday that about 1500 lights on the Selas system have been introduced into the Tay Works of Messrs. Gilroy, in Dundee. It has been found, it is stated, that in mills and factories, with incandescent gas lighting, when air is drawn in through the openings at the burner, the burner becomes choked by the dust and fibre floating about the mill. In the Selas apparatus, the air is drawn from the outside of the mill to obviate this objection. The air and gas are mixed and compressed to 10 inches on a water column. In the Tay Works, the compressor is driven off the existing shafting, and requires only about ⅜ H.P. Inverted mantles, with anti-vibrators, are used; and it is stated that some of the mantles, after having been in use for three months, are unaffected by the dust and shaking of the mill. The light given is 100-candle power for 2 cubic feet of gas per hour. A great merit of the light is said to be found in its suitability for the distinguishing of colours.

Gas Purchase Question at Penistone.—The Penistone Urban District Council have agreed, with only one dissentient, to a proposal that steps be taken to promote a Bill in Parliament for the purchase of the Penistone, Thurlstone, and Oxspring gas undertaking, for the sum of £19,800 or thereabouts. It was subsequently decided to call an informal meeting of ratepayers, to be held yesterday (Monday), and to place the whole matter before them.

Road-Tarring in Hammersmith.—The Hammersmith Borough Council last Wednesday approved of a suggestion of the Borough Surveyor for tar-spraying the macadam and flint roads in the borough. The tar is to be distributed by means of sprinklers attached to a cauldron; and it is possible to spray about 1500 superficial yards per day. The tar to be used is ordinary gas tar, which it is expected will cost 2¼d. per gallon; and a gallon will, in the ordinary way, cover from 15 to 16 yards of road.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 289.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Oct. 14	5	Alliance & Dublin Ord.	86–88	+1	5 13 8
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	Oct. 28	6¼	Bombay, Ltd.	5⅞–6⅛	..	5 6 1
40,000	5	,,	6¼	Do. New, £4 paid	4⅞–4¾	..	5 6 8
50,000	10	Aug. 26	15	Bourne-mouth Gas & Water } 10 p.c. Pref. 6 p.c.	28½–29	..	5 3 5
311,810	10	,,	7		16¼–16⅝	..	4 3 7
75,000	10	,,	6		15¼–15⅝	..	3 16 2
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	253–256	..	4 17 8
300,000	,,	,,	9½	Do. New	191–193	+1	4 18 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
220,000	Stk.	Sep. 10	11	Brighton & Hove Orig.	218–221	+1	4 19 7
246,320	,,	,,	8	Do. A Ord. Stk.	154–157	..	5 1 1
460,000	20	Oct. 14	10	British	42½–43½	..	4 11 11
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c.	118–120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88–90	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c.	106–108	..	5 1 10
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	87–89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	14⅛–14½	..	4 14 11
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	3–4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛–5⅜	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 6
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	80–82	..	5 9 9
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	108½–110½	..	4 10 6
1,493,280	Stk.	Aug. 26	5 5/16	Commercial 4 p.c. Stk.	109–111	..	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	104–106	+1	4 14 4
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	95–97	..	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137–139	..	5 0 9
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	98–100	..	5 0 0
486,090	10	Jan. 27	12	European, Ltd.	24–24½*	..	4 18 0
354,060	10	,,	12	Do. £7 10s. paid.	18½–18¾*	..	4 16 0
15,141,545	Stk.	Aug. 12	4⅝	Gas light and Coke } 4 p.c. Ord.	105–106	+1	4 8 0
2,600,000	,,	,,	3⅛		3½ p.c. max.	88⅝–89½	+⅛ 3 18 3
3,799,735	,,	,,	4		4 p.c. Con. Pref.	103–105	.. 3 16 2
4,193,975	,,	Dec. 29	3		3 p.c. Con. Deb.	81–83	.. 3 12 3
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.		94–96	.. 5 4 2
82,500	,,	,,	6½	Do. do. 5 p.c.		118–120	.. 5 8 4
70,000	10	Sep. 29	11	Hongkong & China, Ltd.		17½–18	.. 6 2 3
131,000	Stk.	Sep. 10	6½	Ilford A and C		144–146	.. 4 9 0
65,782	,,	,,	5	Do. B		108–110	.. 4 10 11
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.		100–102	.. 3 18 5

Issue	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	Nov. 11	8	Imperial Continental	175–177	..	4 10 5
1,235,000	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.	119–121	..	4 19 2
561,000	Stk.	,,	10	Liverpool United A	227–229	..	4 7 4
718,100	,,	,,	7	Do. B	16–16½	..	4 2 10
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103–105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean.	4⅛–5	..	6 0 0
560,000	100	Oct. 1	5	Met of } 5 p.c. Deb.	99–102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12½–13	..	5 7 8
1,775,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con	107–108	..	4 3 4
518,795	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Aug. 26	7	North Middlesex 7 p.c.	13–13½	..	5 3 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	137–139	..	5 15 1
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅛–6⅜	..	6 5 6
31,800	53	Aug. 26	13	Portsea Island A.	137–139	..	4 19 0
60,000	50	,,	13	Do. B.	129–131	..	4 19 3
100,000	50	,,	12	Do. C.	122–124	..	4 16 9
114,800	50	,,	10	Do. D and E.	102–104	..	4 16 2
398,490	5	Oct. 28	7	Primitiva Ord.	7⅛–7⅜	..	4 14 11
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅛–5⅜*	+⅛	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98–100	–⅛	4 0 0
1,000,000	10	Oct. 14	8	River Plate Ord.	17–17½	..	4 11 5
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
250,000	10	Sep. 29	8	San Paulo, Ltd.	14½–15	..	5 6 8
62,500	10	,,	6	Do. 6 p.c. Pref.	11½–12½	..	4 18 0
125,030	50	Jan. 3	5	Do. 5 p.c. Deb.	50–51	..	4 18 0
135,000	Stk.	Sep. 10	10	Sheffield A	233–235	..	4 5 1
209,981	,,	,,	10	Do. B	233–235	..	4 5 1
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	Oct. 14	10	South African	12½–12¾	..	7 16 11
6,429,895	Stk.	Aug. 12	5½	South Met., 4 p.c. Ord.	121–122	+½	4 7 4
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	81–83	..	3 12 3
209,820	Stk.	Aug. 26	8	South Shields Con. Stk.	160–162	..	4 18 9
605,000	Stk.	Aug. 12	5½	S'th Suburb'n Ord. 5 p.c.	120–122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	120–122	..	4 2 0
502,310	Stk.	Nov. 11	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Aug. 12	6¼	Tottenham and } A 5 p.c.	134–136	+1	5 0 11
453,940	,,	,,	5⅝	} B 3½ p.c.	112–114	+1	4 14 7
149,470	,,	Dec. 29	4	Edmonton } 4 p.c. Deb.	98–100	..	4 0 0
182,380	10	Dec. 29	8	Tuscan, Ltd.	9½–9⅝	+⅛	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	112–114	+1	4 7 9
255,636	Stk.	Aug. 26	6⅝	Wands- B 3½ p.c.	139–141	..	4 14 0
79,416	,,	Dec. 29	3	worth 3 p.c. Deb. Stk.	73–75	..	4 0 0

Prices marked * are "Ex div."

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Jan.* 29.

In consequence of the requirements for January shipment being covered, the pace has become slower, and no further advance has taken place, with the exception of Leith, where it is reported that £11 17s. 6d. per ton has been paid for immediate delivery. Demand has, however, been sufficient to sustain the market at last week's level; and the quotations at the close are £11 12s. 6d. per ton f.o.b. Hull, £11 13s. 9d. to £11 15s. per ton f.o.b. Liverpool, and £11 16s. 3d. per ton f.o.b. Leith. Very little interest is being shown in the forward position; consumers evidently preferring to delay making purchases in the hope of values being easier later on.

Nitrate of Soda.

This article continues rather dull, but holders firmly maintain spot prices at 9s. 1¼d. per cwt. for 95 per cent. quality and 9s. 4½d. for 96 per cent.

Tar Products. LONDON, *Jan.* 31.

The markets for tar products have been firm throughout the past week. Pitch maintains its position. If anything, it is still advancing in price, and is very firm all round, especially on the west coast, where it appears to be decidedly scarce. In Belgium, the consumers seem disposed to await the course of events before covering at present; but it is believed that they have a considerable quantity to buy for March-June delivery. In the North of France, the works are well supplied, and in the Bay a fair quantity has been sold at good figures. In South Wales, the manufacturers are evidently covered for their present requirements, and will not buy until they have secured their fuel contracts. Creosote is steady all round, and there appears to be a general impression that prices will improve after March. Benzol is very firm indeed for both prompt and forward delivery; and 50-90 per cent. appears to be rather scarce. Toluol is steady, and there is a good demand for it in the North. Solvent naphtha is scarce, and is fetching good prices. There has been a slight improvement in carbolic acid. Refined naphthalene is unchanged; but there is plenty of inquiry for salts. Tar well maintains its price.

The average values during the week were: Tar, 15s. to 19s. *ex* works. Pitch, London, 31s.; east coast, 30s. 6d. to 31s.; west coast, 30s. to 31s. f.a.s. Mersey ports, 30s. f.o.b. others. Benzol, 90 per cent., casks included, London, 7d. to 7⅛d.; North, 6⅞d. to 7d.; 50-90 per cent., casks included, London, 7⅛d. to 7⅜d.; North, 7⅛d. to 7⅛d. Toluol, casks included, London, 10d.; North, 9½d. to 10d. Crude naphtha, in bulk, London, 4¼d. to 4½d.; North, 4d. to 4¼d.; solvent naphtha, casks included, London, 1s. 1½d. to 1s. 2½d.; North, 1s. to 1s. 1d.; heavy naphtha, casks included, London, 11½d. to 1s.; North, 11d. to 11½d. Creosote, in bulk, London, 2⅝d. to 2¾d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast, 11½d. to 1s.; west coast, 11¼d. to 1s. Refined naphthalene, £4 10s. to £8 10s.; salts, 45s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been steady during the past week. The principal London Gas Companies are quoting £11 12s. 6d. to £11 15s.; while outside makes upon Beckton terms are £11 6s. 3d. to £11 8s. 9d. In Hull, business has been done at £11 12s. 6d. for ordinary makes, while for the best qualities even higher prices have been secured. In Liverpool, business has been done at £11 15s.; and in Middlesbrough, at £11 12s. 6d. to £11 15s. In Leith, makers are asking £11 16s. 3d. to £11 17s. 6d.

COAL TRADE REPORTS.

Northern Coal Trade.

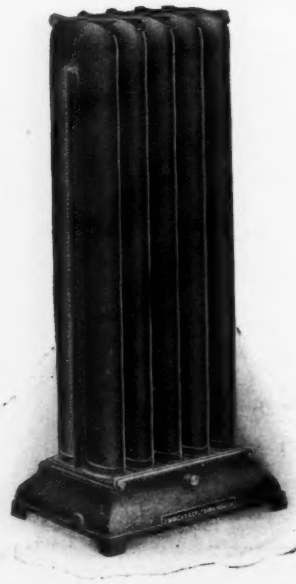
Work is now more regular at the northern collieries. There is a decided improvement in the production; and, in a few instances, an ease in the prices has been the result. In steam coals this is the more shown; best Northumbrians being now about 10s. 7½d. to 10s. 9d. per ton f.o.b., second-class steams about 10s., and steam smalls from 5s. 6d. to 6s. 6d. The steam coal supply is now adequate for current needs. As to gas coals, there is still a moderate output only, but it is one that is increased and increasing, so that there is a much better delivery on the long contracts than there was. Prices continue a little uncertain; but Durham gas coals may be put as from about 10s. 9d. to 11s. 9d. per ton f.o.b. for the usual classes, and up to 12s. for "Wear specials." Some delay of steamers has been caused by the storm at the end of the week, and railway traffic was moved with more difficulty; but there is now a better prospect in that respect. In the contract line, that for Helsingfors is reported to have been placed, at about 14s. 6d. per ton, delivered, for best Durham gas coals, the amount being some 17,000 tons. The Magona gas coal contract is also in the market, for a rather less quantity, to be shipped in the next two months or so. Coke is firm; and good gas coke has been in heavier demand—the price being from 13s. 3d. to 13s. 9d. per ton f.o.b. for shipment in the Tyne or Wear.

Scotch Coal Trade.

There is less activity in the coal market. The shipping demand has fallen off, as it usually does at this season; and stormy weather has also interfered with it. The home trade, though good, has not improved. The prices now quoted are: Ell, 10s. to 11s. per ton f.o.b. Glasgow; splint, 11s. to 11s. 3d.; and steam, 9s. 6d. to 9s. 9d. The shipments for the week amounted to 300,659 tons—an increase of 37,610 tons upon the previous week, and of 53,029 tons upon the corresponding week of last year. For the year to date, the total shipments have been 712,590 tons—an increase of 132,768 tons upon the corresponding period.

The Most Popular Radiator For Places where a Radiator With Flue is Desirable!

The "Official" Flue Radiator.



The "Official" is a Radiator *Without Internal Parts.*

The "Official" is constructed by Experts in Radiator Manufacture, and embodies the results of over 40 years' experience in Radiator Construction.

JOHN WRIGHT & CO.,
The Radiator Experts,
Essex Works, BIRMINGHAM.

227.

Melbourne Metropolitan Gas Company.—The London agents for this Company (Messrs. John Terry and Co.) have received a cable advice to the effect that the profits for the half year ended the 31st of December last were £85,780. A dividend of 5s. per share has been declared for this period, a sum of £45,670 added to the reserve fund, and a balance of £2210 carried forward.

Electric Explosion in a Manchester Street.—Early last Friday morning, an alarming explosion occurred in Piccadilly, Manchester, due to the fusing of an electric cable. The pavement surrounding the fuse-box where the mishap took place was thrown up, and a column of flame shot into the air, followed by dense smoke. The City Fire Brigade turned out; but it was found that the business premises in the vicinity had not been set alight. Had the explosion taken place later on in the day, there must have been several people more or less seriously injured, as this thoroughfare is a very busy one.

Wicklow Gas Bill.—Committee reports have been submitted to the Wicklow Urban District Council on the subject of the Gas Company's Bill. These recommended that a report be obtained from the Solicitor and Engineer to enable them to consider the several provisions of the Bill; and they added that they had directed the Town Clerk to ascertain from the Dublin Corporation the name of a gas expert to advise them on the Bill generally. They recommended that a clause be secured in the Bill giving the Council the option of purchase, and that the standard price of gas be fixed at 3s. They also recommended that the clause dealing with electric light powers be deleted, and a new one substituted protecting the urban district against monopoly; and that no mains should be laid without the express sanction of the Council between April 1 and Oct. 1—this not to apply to service-pipes. After a long discussion, it was resolved that the reports be approved as the basis of a conference with the Gas Company, and that the Committee open negotiations forthwith.

Proposed New Water Supply for Warrenpoint.—Last Tuesday, Mr. P. C. Cowan, Chief Engineering Inspector of the Local Government Board of Ireland, held an inquiry in the Town Hall, Warrenpoint, respecting the petition of the Urban District Council for a Provisional Order to authorize them to construct water-works for the town, and to raise a loan of £8180 for the purpose. Mr. W. Johnson, Solicitor for the Council, pointed out that as Warrenpoint was a health and tourist resort which was rapidly growing in favour, the Council decided to provide the town with the best possible water supply. The present works were constructed in 1875, and were quite inadequate to meet the growing needs of the place; and the Council decided to get from the Mourne Mountains a new supply which was of the purest character, and was so abundant as to meet all requirements. Mr. B. M'Kerron (Town Clerk), Mr. J. Carroll (Chairman of the Council), Messrs. J. H. Swiney and Mr. W. J. Watson (Engineers), and others, having been examined on behalf of the Council, Mr. M'Murray gave evidence suggesting alterations to the existing scheme instead of having the new scheme. A ratepayer addressed the Inspector in opposition to the application; and the inquiry concluded.

Swansea and the Burner Bill.—At a meeting of the Swansea Street Committee last week, the Town Clerk said a number of gas companies were approaching Parliament with a view to altering the present method of testing the illuminating power of their gas. This, he asserted, would have the effect of reducing the illuminating power; and if the illuminating power were reduced, the heating power must also be reduced. The companies met the objection of reduced lighting power by saying it could be overcome by artificial methods; but then arose the question of who was to pay for the artificial methods. He had asked the Town Clerk of Liverpool whether it would not be possible for representatives of all corporations interested to meet and decide on a concerted course of action; and the result was that a meeting had been arranged.

Opposition to the Cambridge Water Bill.—At the meeting of the Cambridge Town Council last Thursday, the General Purposes Committee reported that they had had before them the Bill promoted by the Cambridge Water Company for the purpose of obtaining additional powers. The Company were seeking authority to sterilize or otherwise treat the water supply, to acquire land and construct a reservoir in the parish of Cherryhinton, and to sink wells in that parish and at Fulbourn, to increase or alter any of the existing rates, rents, and charges now authorized to be levied by the Company, and to levy additional rates, rents, and charges. The Committee said they had carefully considered the various clauses of the Bill, and were of opinion that steps should taken to oppose it. They therefore submitted resolutions to enable this to be done. The Mayor (Alderman W. P. Spalding), in moving the adoption of the report, said he hoped there would be unanimity of feeling on this matter. The object of the Council was the same as that of the Water Company in promoting the Bill, and that was to ensure that the water supply of Cambridge should be made as good as it possibly could be. The motion was carried.

Completion of the Vyrnwy Water Scheme.—At their meeting this month, the Liverpool City Council will be recommended by the Water Committee to desire the Lord Mayor to send, in the name of the Corporation, an invitation to H.R.H. the Prince of Wales to perform, during March, the inauguration ceremony at the completed reservoir and intake works associated with Lake Vyrnwy. It will mark the completion of the Vyrnwy works according to the threefold ingathering scheme (there being three rivers to impound) originated by the late Mr. George F. Deacon, the Constructing Engineer. In the first stage of the works, the valley of the Vyrnwy was closed by masonry; the village in the valley being demolished before the rising of the water in the reservoir. The valleys of the remaining two rivers—the Conway and the Marchnant—which formerly flowed into the Vyrnwy, have been each curtailed, and the waters diverted. This has been effected by means of tunnels through the hills. Hence all the three rivers now flow into the Vyrnwy reservoir. Nothing of the original scheme remains to be carried out except the construction of a third pipe-line when the demands of the city and district overtake the present abundant supply through the two existing lines.

SOUND ADVICE.

REMINDER.

Maintain an ample stock of Richmond's "A.B.C." Gas Fires and "MONARCH" Gas-Steam Radiators, &c. JANUARY, FEBRUARY and MARCH *coldest months.*

Our Sales of "A.B.C." Gas Fires and Radiators have far exceeded any previous Season. "Merit will Tell."

THE RICHMOND GAS STOVE & METER CO.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. General Offices and Works: Warrington.

Serious Gas Explosion at Wigan.—Owing, it is thought, to subsidence, a 6-inch gas-main in front of the house occupied by Mr. Jenks, in York Street, Wigan, was fractured last Wednesday evening, and the escaping gas found its way into the house, and was ignited by a lighted gas-jet or the fire. An explosion followed, which not only wrecked the house, but did considerable damage to the property.

Heywood Corporation and Stand-by Charges.—It may be remembered that in the article on "Gas Acts for 1909" in the "JOURNAL" for Oct. 12 last it was mentioned that the Heywood Corporation Act contained clauses relating to supplies to consumers who have separate gas installations, and to the minimum charge to be made for gas laid on to premises having a supply of electricity. As these clauses formed precedents, they were quoted *in extenso*. In virtue of the power thereby conferred, the Town Council have adopted a schedule of stand-by charges, ranging from 5s. up to 25s. per quarter, according to the size of the meter, from ten lights upward, when the gas consumption does not amount to the above-named sums. The new scale will come into operation as from the 31st of next month.

Exmouth Water Bill.—A poll of the ratepayers of Exmouth last week resulted in an emphatic pronouncement in favour of the promotion of the District Council's Water Bill. Both the supporters and opponents of the Dotton water scheme made use of the ordinary electioneering methods to gain votes; meetings being held on each side, the town placarded, and vehicles employed to bring up voters. As the result of this energy, 1997 persons voted, of whom 1129 were in favour of the scheme and 768 against it—a majority of 361 for the Bill. Last January, when a similar poll was taken, 1341 ratepayers voted; and the result then was a majority of three against the promotion of the Bill. Since then, however, the boring at Dotton has been carried to a point at which its success has been demonstrated.

Opposition to the Proposed New Standard Burner.—The Brighton Town Council have decided, on the recommendation of the General Purposes Committee, acting upon a report made by the Town Clerk, to oppose the Bill of the Brighton and Hove Gas Company. One objection is to the proposal to substitute the "Metropolitan" No. 2 burner for the "London" argand for testing the illuminating power of the Company's gas. The Herne Bay Urban District Council will petition against the Gas Companies (Standand Burner) Bill, with the view of securing amendments similar to those required by the Cambridge Town Council, an indication of the scope of which was given in the "JOURNAL" for the 11th ult. (p. 111). At a special meeting of the Radcliffe Urban District Council last Thursday, it was decided to oppose the Standard Burner Bill.

Suicides by Coal Gas.—Last Tuesday an inquest was held on Mrs. Matilda Mason, a widow, residing at No. 26, Grenville Place, Brighton, who was discovered dead in bed on the preceding morning under circumstances which clearly pointed to a determination to take her own life. On the house of the deceased being forced open, the place was found to be full of gas; and the medical evidence was to the effect that death was the result of suffocation. As Mrs. Mason had been depressed, the Jury returned a verdict of "Suicide while temporarily of unsound mind." Mrs. Annie Buss, the wife of a Hastings carman and contractor, was found dead in her house last Wednesday morning. At the inquest, the husband stated that he was awakened by his son saying that the house was full of gas. Shortly afterwards the deceased was found in a chair in front of the gas-stove in the scullery. All the taps were turned on, and the windows were closed. Mr. A. T. Field, Police Surgeon, who had made a post-mortem examination, said death was due to asphyxia from coal gas. The Jury returned a verdict of "Suicide during temporary insanity."

Darkness in the "City of Light."—In view of the extent of the terrible floods with which Paris has been visited, it is not surprising to learn that failures of the public lighting have occurred in various parts of the city. The wonder rather is that they have not been more numerous. Although the lamp-posts at the Bercy end of Paris were last week under water almost up to the lantern, the burners were lighted; but at Suresnes the gas supply was cut off, and the streets were illuminated by firemen carrying torches. On some of the bridges the electric light failed; and the magnificent Alexander III. Bridge, which is usually ablaze with electricity, was dimly lighted by oil-lamps. On Friday night, the St. Denis quarter—notorious as a residence of the criminal classes—was plunged in darkness; and a strong force of police had to be sent there in anticipation of disturbances. The fashionable quarter of the Champs Elysées was not more highly favoured, for neither gas nor electric light was available. On Sunday both banks of the Seine were almost without any uniform or efficient light, with the exception of a few favoured quarters in the Bois de Boulogne district. According to the Paris Correspondent of "The Times," the interruption of the electric lighting service is likely to continue for some days, as the underground machinery is completely submerged.

Messrs. John J. Griffin and Son, Limited, of Kingsway, have introduced an adjustable clip (intended to supersede the old cumbersome brass clips in laboratory apparatus) which holds a single watch-glass or a pair of glasses equally securely. It consists of two small rods united by a steel spring wire sufficiently strong to hold firmly a pair of glasses; the ground edges being kept in contact all round. On the other hand, a single glass is as securely fixed, owing to the elasticity of the spring enabling it to resume its original position as soon as the glasses are removed.

Messrs. Falk, Stadelmann, and Co. have sent us a circular of the "Veritas" advertising shield, which they have introduced for Graetzin and similar inverted lamps; having been devised to supersede the existing heavy and expensive forms of transparent screens. It consists of a semi-circular white enamelled iron tablet, which is attached to the reflector by means of adjustable brass grips, and is suspended under the globe. The advantages claimed for the shield (for which a patent has been applied for) are that the inscription upon it is as legible by night as by day; that it absorbs no light and casts no shadow; and that it is cheap.

What about the Hot Water?

Shall your Consumers still be dependent on the Coal Fire?

MAUGHAN GEYSERS

will give a Hot Bath in a **few minutes** at a cost of **3d. / 4**

THE "HOLBORN" CIRCULATOR

will supply the whole House, with great economy.

May we send you our suggestions for supplying these to your Consumers on lines successfully adopted by other Gas Undertakings?

Special apparatus for all Hot Water Requirements.

THE PARKINSON STOVE CO., LTD.

(Incorporating Maughan's Patent Geyser Co.)

BIRMINGHAM: Stour Street, Spring Hill.

LONDON: 129, High Holborn.

The Laddite Incandescent Mantle Company, Limited, have removed from Audrey House, Ely Place, E.C., and on and after to-day their general offices will be at their works, Penrhyn Road, Kingston-on-Thames.

The South Metropolitan Gas Company have ordered four "Bennis" stokers and compressed air furnaces for 8-feet Lancashire boilers from Messrs. Ed. Bennis and Co., Limited, of Little Hulton, Bolton. This is a repeat order for stokers.

The local Gas Company have written to the Bideford Urban District Council explaining that it is hoped, with better supervision, there will not be any complaints against the automatic lighting apparatus on the lamps; but if there still is cause for complaint, the Company will remove them. It was decided to allow the question of having them removed to stand over for another month.

Tenders have lately been received for a covered service reservoir and scheme of mains for the water supply and protection from fire of Beaudesert Hall, Staffordshire, which Messrs. G. & F. W. Hodson, of Loughborough, have designed for the Marquis of Anglesey. The tenders ranged from £3457 down to £2169; and the last-named sum, for which Mr. G. Law, of Kidderminster, was willing to do the work, was accepted.

The Gilbert Little Company, Limited, of Horton Works, Bradford, have issued a new catalogue of their coal screening and washing plant, conveyors, elevators, aerial wire ropeways and cableways, &c. The particulars are preceded by an article, reprinted from the "Indian Engineer," on "The Evolution and Development of Transport Appliances," by Messrs. G. W. White and M. Colquhoun Little, who are Joint Managing-Directors of the Company.

The Gas Committee of the Corporation of Stoke-on-Trent and their Engineer (Mr. W. Prince) have for some time had under consideration the question of the improved lighting of their main roads and streets. After an extended trial, an order has been placed with Messrs. D. Anderson and Co., of Farringdon Road, E.C., for a large number of the "Dacolight" regenerative inverted burner lamps of which they are the patentees and manufacturers. The installation will consist of about 100 of the 2-light square type of lamp, a number of 4-light lamps of the hexagon type, and 3-light circular lamps. On completion, this will form one of the most complete and up-to-date lighting schemes in the country.

APPLICATIONS FOR LETTERS PATENT.

1151.—Breeden, J., and Co., Limited, and Breeden, F., "Incandescent gas-lamps." Jan. 17.
1166.—Deutsche Gasglühlicht Akt.-Ges. (Auerges.), "Suspending lamps on supports crossing streets." Jan. 17.
1286.—Muller, W., "Discharging machine with jointed ram for horizontal and inclined coke-ovens." Jan. 18.
1354.—Koppen, O., "Incandescent burners." Jan. 18.
1356.—Wardale, A. E., "Reducing valves." Jan. 19.
1364.—Wood, J. H., "Supporting shades, &c." Jan. 19.
1397.—Abady, J., Simmance, J. F., and Yorke, W., "Water-meters," Jan. 19.
1477.—Leatherbarrow, J., and Stafford A., "Reducing-valve." Jan. 20.
1488.—Sykes, H., "Gas-check." Jan. 20.
1489.—Bray, A., "Gas-fittings." Jan. 20.
1500.—Fielden, F., "Gas-producers." Jan. 20.
1501.—Spurr, G. R., and Taylor, W. H., "Gas-producer." Jan. 20.
1523.—Stringfellow, J. H. W., "Improvements in gas-making." Jan. 20.
1533.—Kloumann's, and Birkeland, R., "Water-pipes." Jan. 20.
1534.—West, J., "Discharging and charging gas-retorts." Jan. 20.
1561.—Wood, A., and George Bray and Co., Limited, "Shades for gas." Jan. 21.
1562.—Wood, A., and George Bray and Co., Limited, "Fitting for flexible metallic tubing." Jan. 21.
1563.—Sturge, W. H., "Suspension of gas-fittings." Jan. 21.
1565-6.—Stinchcombe, H., "Suction producers." Jan. 21.
1594.—Hands, G., and Breeden, F., "Incandescent burner fittings." Jan 21.
1599.—Quemby, B. J., "Operating taps and cocks." Jan. 21.
1653.—Middleton, S. H., "Gas-taps." Jan. 22.
1671.—Williams, B. G., "Prepayment meter mechanism." Jan. 22.
1699.—Jähde, E., "Glass globes for lights." Jan. 22.

The largest consumption of gas in Manchester during any 24-hour period this winter was reached last Wednesday, when 27,904,000 cubic feet were used. The department's record for a day's supply is held by Dec. 12, 1905, when the consumption totalled 28,810,000 cubic feet.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

Working Foreman. Newport (Salop) Gas Works.

Situations Wanted.

Secretary, Manager, or Accountant. No. 5175.
Sulphate Plumbing. Leadburner, 117, Galloway Road, Shepherd's Bush.

Plant, &c. (Second Hand), for Sale.

Complete Gas Works Plant (except Buildings). Particulars from the Eastbourne Gas Company.
Gasholders, Scrubber, Condenser, Station Meter, Exhauster, Hydraulic Main, Pipes, &c., &c. J. Harper and Co., Willenhall.
Purifiers, Scrubbers, and Condensers. Edinburgh and Leith Gas Commissioners.

Patent Rights.

Gas Stove Utensils. No. 5175.

Stocks and Shares.

Aldershot Gas, Water, and District Lighting Company. Feb. 15.
North Middlesex Gas Company. Feb. 15.
Southgate Gas Company. Feb. 15.

Meetings.

Brentford Gas Company. St. Ermin's Hotel, Feb. 11, 2.30 o'clock.
South Suburban Gas Company. De Keyser's Hotel, Feb. 18, Three o'clock.
Southgate and District Gas Company. London Offices, Feb. 17, 3.45 o'clock.
Uxbridge Gas Company. Offices, Feb. 17, 2.30 o'clock.

TENDERS FOR

Coal.

Milford Haven Urban District Council. Tenders by Feb. 12.
Nelson Gas Department. Tenders by Feb. 14.

Cookers.

Barrow-in-Furness Corporation. Tenders by Feb. 22.

Fire-Clay Goods.

Barrow-in-Furness Corporation. Tenders by Feb. 22.

Gas Oil.

Devonport Gas Department. Tenders by Feb. 5.

General Stores (Ironmongery, Brass Fittings, Cocks, Oil, Lime, &c., &c.).

Barrow-in-Furness Corporation. Tenders by Feb. 22.
Nelson Gas Department. Tenders by Feb. 14.
Salford Gas Department. Tenders by Feb. 10.

Meters.

Barrow-in-Furness Corporation. Tenders by Feb. 22.

Pipes, &c.

Barrow-in-Furness Corporation. Tenders by Feb. 22.

Sulphuric Acid.

Barrow-in-Furness Corporation. Tenders by Feb. 22.
Nelson Gas Department. Tenders by Feb. 14.

Tar.

Barrow-in-Furness Corporation. Tenders by Feb. 22.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
Palmerston House,
Old Broad Street, London, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
Andrew Stephenson, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
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SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.
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Telephone: 341 Avenue.

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J. W. & C. J. PHILLIPS, 23, College Hill, London, E.C., and 25, Bridge End, Leeds.

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It is also used for the enrichment of Gas.
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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
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FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
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Telegrams: "CHEMICALS, OLDBURY."

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JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

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THE Eastbourne Gas Company, having acquired the Hailsham Gas Undertaking, invite TENDERS for TAKING DOWN and PURCHASING the Whole of the PLANT at the Hailsham Works (excepting buildings). Two small HOLDERS, Two BENCHES OF RETORTS, Nearly New Braddock's 6-inch GOVERNOR, STATION-METER ENGINE and EXHAUSTER (Waller), STEAM BOILER, PHOTO-METER, WORKS MAINS and SUNDRY SCRAP.

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Two Sets of WATER-LUTE PURIFIERS, 24 feet by 19 feet.

One Set of WATER-LUTE PURIFIERS, 27 ft. 6 in. by 24 ft.

Two TOWER SCRUBBERS, each 60 feet High by 13 feet Diameter.

One Battery of WROUGHT-IRON ANNULAR CONDENSERS, 31 ft. 6 in. high. Inner Tube, 22 inches Diameter.

Detailed Specifications and Drawings can be supplied to Persons contemplating the Purchase of this Plant, and references given to other Works where similar Plant has been transferred.

For further Particulars and full Information, Apply to the undersigned.

W. R. HERRING,
General Manager.

Calton Hill, Edinburgh,
Jan. 21, 1910.

DEVONPORT CORPORATION.

(GAS DEPARTMENT.)

TENDERS are invited for the Supply of from 150,000 to 200,000 Gallons of GAS OIL for the Year ending the 31st of March, 1911.

The Oil to be delivered in bulk to the Corporation Wharf, Devonport, as required.

A Sample of the Oil to be submitted, and Tenders to be delivered on or before Feb. 5, 1910.

W. P. TERVET,
Engineer and Manager.

Gas-Works, Devonport.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Department invite Tenders for the Supply of about 700 Tons of LIME required for the Purification of Gas at their respective Stations during the Twelve Months commencing the 1st of April, 1910.

Full Particulars may be obtained on Application to Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Lime," to be delivered to me not later than Three p.m., on Thursday, the 10th of February, 1910.

L. C. EVANS,
Town Clerk.

Salford, Jan. 28, 1910.

BOROUGH OF NELSON.

(GAS DEPARTMENT.)

SUPPLY OF GENERAL REQUIREMENTS, AND SALE OF SURPLUS TAR.

THE Gas Committee invite Tenders for the Supply of the following requirements during the Twelve Months ending the 31st of March, 1911.

(*a*) GAS COAL.
(*b*) GENERAL IRONMONGERY.
(*c*) BRASS FITTINGS.
(*d*) SULPHURIC ACID.

The Committee also invite TENDERS for the Purchase of the Surplus TAR, produced at their Nelson and Brierfield Works during Twelve Months ending the 31st of March, 1911.

Form of Tender for each item, together with full Particulars, may be obtained on Application to Mr. A. J. Hope, Engineer and Manager, Gas-Works, Nelson.

Sealed Tenders, duly endorsed, must be sent to the undersigned not later than Monday, Feb. 14, 1910.

J. H. BALDWICK,
Town Clerk.

Town Hall, Nelson,
January, 1910.

URBAN DISTRICT OF MILFORD HAVEN.

TENDERS FOR GAS AND STEAM COAL.

THE Milford Haven Urban District Council are prepared to receive TENDERS for about 1400 Tons of Large GAS COAL and about 50 Tons of BITUMINOUS STEAM COAL, to be delivered between the 1st of April, 1910, and the 31st of March, 1911, the whole of the Coal to be Fresh Hewn, Clean, and free from all Impurities.

Further Particulars and Forms of Tender can be obtained on Application to the undersigned.

Sealed Tenders, endorsed as follows:—

First:—"Tender for Gas Coal," addressed to the Chairman of the Gas and Water Works Committee.

Second:—"Tender for Steam Coal," addressed to the Chairman of the Highways, Lighting, and Public Improvements Committee.

Tenders to be delivered not later than Saturday, the 12th of February, 1910.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
THOMAS H. LEWIS,
Clerk.

Milford Haven,
Jan. 29, 1910.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the Purchase of Surplus GAS TAR and OIL-GAS TAR, produced at their Gas-Works from the 1st day of April next to the 31st day of March, 1911, delivered into the Purchaser's Tank-Waggons at the Gas-Works Siding.

Any further Information may be had on Application to the Manager of the Gas-Works.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Tar," to be delivered at the Town Clerk's Office on or before Tuesday, the 22nd day of February, 1910.

The highest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

THE Corporation are prepared to receive TENDERS for the Supply of FIRE-BRICKS, CAST-IRON PIPES, WROUGHT-IRON TUBES and FITTINGS, BRASS COCKS, GAS-METERS, GAS-COOKERS, OIL, LIME, IRON-MONGERY, and SULPHURIC ACID, as may be required from the 1st day of April next to the 31st day of March, 1911.

Sealed Tenders, on Forms to be obtained at the Office of the Manager of the Gas and Water Works, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Stores," to be delivered at the Town Clerk's Office on or before Tuesday, the 22nd of February, 1910.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

BRENTFORD GAS COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at St. Ermin's Hotel, Caxton Street, Westminster, on Friday, the 11th of February next, at Half-past Two o'clock precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending the 31st day of December last, and to elect Directors and Auditors in the place of those who will at such Meeting go out of Office in compliance with the Company's Acts of Parliament.

By order,
WILLIAM MANN,
Secretary.

Office, Brentford,
Jan. 25, 1910.

SOUTH SUBURBAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the De Keyser's Royal Hotel, Victoria Embankment, London, E.C., on Friday, the 18th day of February, 1910, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st of December last; to declare a Dividend for the same period; to elect Two Directors and One Auditor in the place of those retiring by rotation; and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from the 4th day of February, until after the Meeting.

By order of the Board,
CHARLES M. OHREN,
Secretary.

Offices and Works:
Lower Sydenham, S.E.,
Feb. 1, 1910.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, in the City of London, on Thursday, the 17th day of February inst., at 3.45 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1909; to declare Dividends; to elect Two Directors and an Auditor; and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 4th to the 17th of February, both days inclusive.

ERNEST L. BURTON,
Secretary.

Secretary's Office: 5, Great Winchester Street,
Old Broad Street, London, E.C.,
Feb. 1, 1910.

UXBRIDGE GAS COMPANY.

NOTICE is Hereby Given, that the FORTY-NINTH ORDINARY GENERAL MEETING of the Company will be held at the Office, 162, High Street, Uxbridge, on Thursday, the 17th day of February, 1910, at 2.30 o'clock in the Afternoon when the following Business will be transacted—viz.: the presentation of the Directors' Report, and the Balance-Sheet and the Declaration of Dividend; the Election of Directors and an Auditor; and the Remuneration of the Secretary.

AND NOTICE IS FURTHER GIVEN, that the STOCK TRANSFER BOOKS of this Company WILL BE CLOSED from the 3rd to the 17th days of February, 1910, both inclusive.

NOTICE IS ALSO HEREBY GIVEN, that, immediately after the Transaction of the Business of the Ordinary General Meeting, an EXTRAORDINARY GENERAL MEETING of the Company will be held at the Company's Offices: To authorize the Directors to raise £20,000 by the creation and issue of Preference Shares or Stock, being a further portion of the Additional Capital authorized by the Uxbridge Gas Act, 1906, and to exercise any powers of borrowing by Mortgage or by the creation of Debenture Stock which attaches to the creation and issue of such Preference Shares or Stock in pursuance of the Acts of Incorporation, in such manner and at such times as they may determine.

By order of the Board,
GEORGE J. BRISTOW,
Secretary.

Uxbridge, Jan. 27, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
NORTH MIDDLESEX GAS COMPANY.

NEW ISSUE OF £7500 FIVE PER CENT. PREFERENCE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Feb. 15, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHGATE AND DISTRICT GAS COMPANY.

NEW ISSUE OF £5000 FIVE PER CENT. PREFERENCE STOCK,
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By order of the Directors of the
ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.

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OF SOME OF THE
Principal Water Undertakings
OF THE
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NAMELY:
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FOR THE YEAR 1908-1909.
Compiled by
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Chartered Accountants.
LONDON:
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PATENT
CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.
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UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Please apply for Price, Analyses, and Report, to the
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Refills (5000 sparks) 9d. and 1/- each retail.
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Highest Results in Gas, & Excellent Coke.
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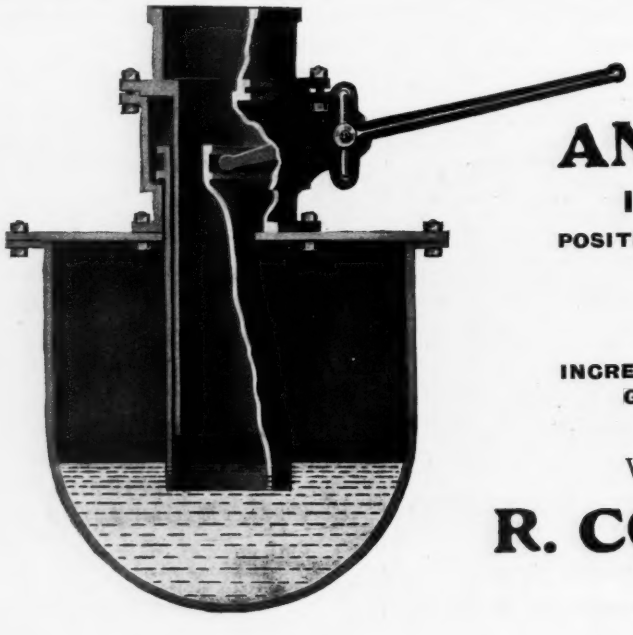

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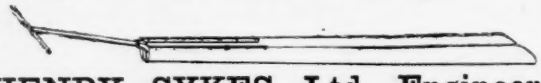

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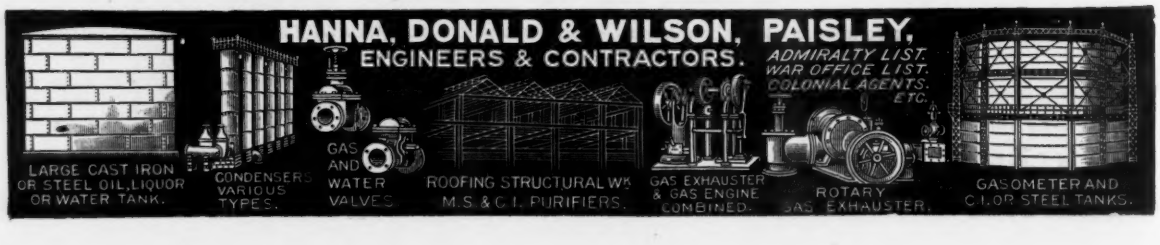
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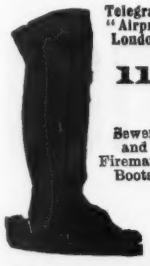

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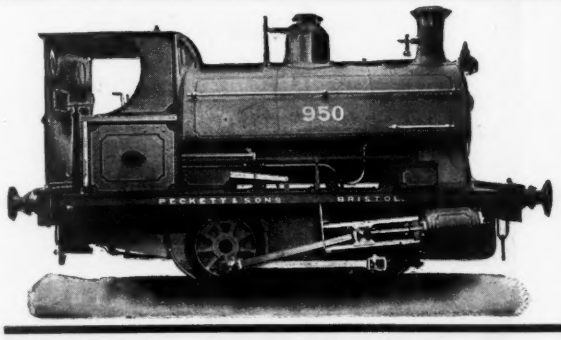

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Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

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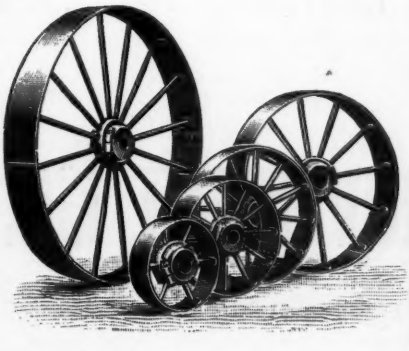

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Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

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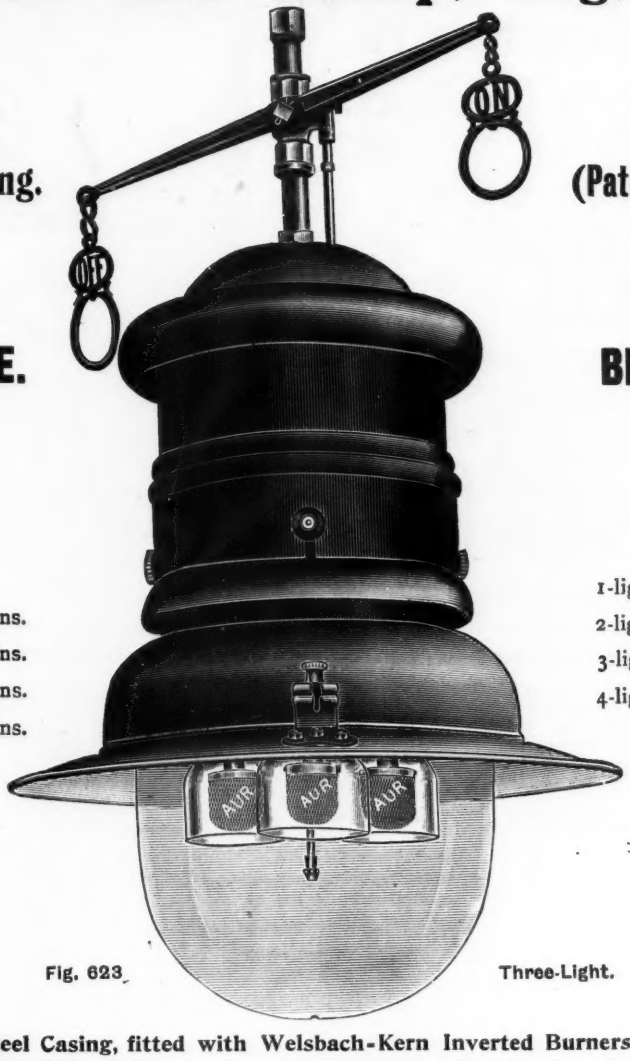

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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No Power.

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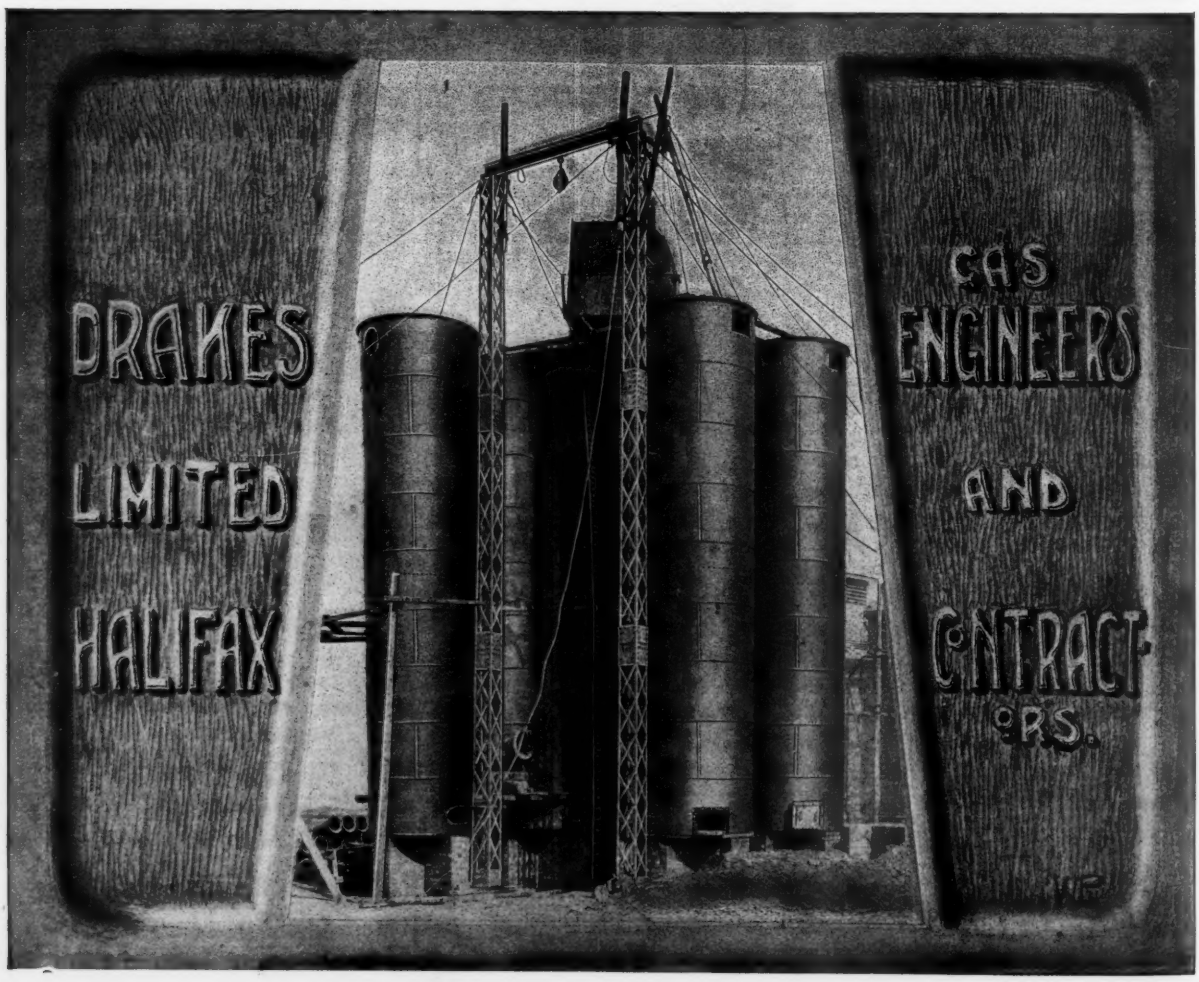

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WITH

TAR CARBURETTING

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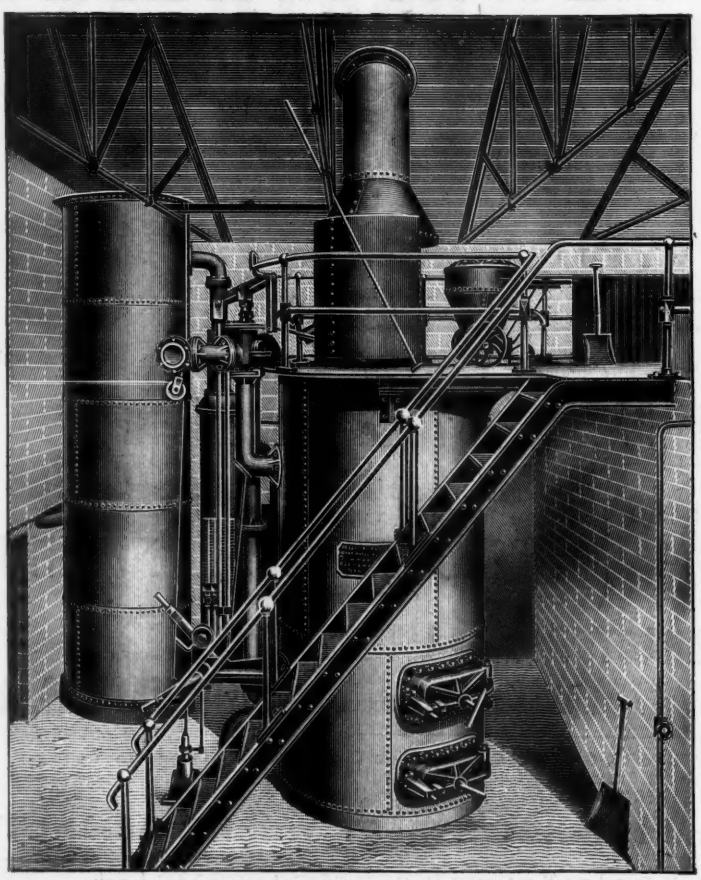

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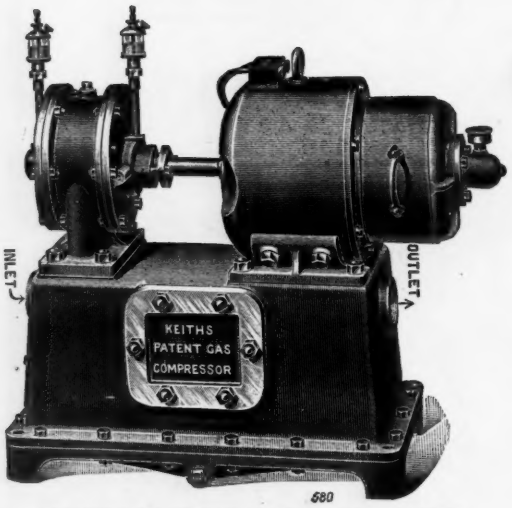

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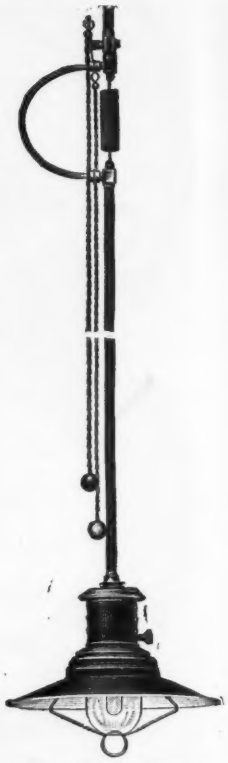

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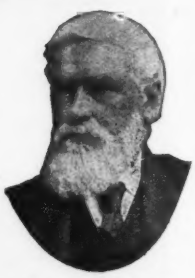

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